4500 STRATEGIC RESPONSE STRATEGIES

This section will discuss the strategic objectives as well as the general response philosophy, strategies and countermeasures that will be applied by the Unified Command System (UCS) to discharges of oil within the boundaries of the area delineated in section 9110. In addition, the various oil containment, recovery and removal methods available to the UCS will also be discussed along with shoreline cleanup options that could be employed during a spill response.

United States Policy- In the Clean Water Act, Congress declared "... it is the policy of the United States that there should be no discharges of oil or hazardous substance..., and that necessary actions shall be undertaken to remove discharges and eliminate the threat of imminent discharges." This policy is reiterated to serve as a guiding light for the flow of response decisions and allocation of resources. In support of U.S. policy, the paramount response strategy that should be implemented by the Unified Command is to allocate resources to their optimum use; i.e. the most oil recovered, contained, or prevented from being discharged per expenditure of resources. The only variance from this strategy should be considerations of safety and of particularly critical natural (environmentally sensitive) or man-made (economically significant) resources that may demand protection even though manpower and equipment may be deployed elsewhere to more efficiently recover oil. Examples of the latter may include protecting a waterfront area that may be threatened by fire or explosion if impacted, and protecting a municipality's water supply. The priorities of strategic objectives must be carefully considered since they vary from case to case, but generally they are as follows:

Stop the Source: Typically the highest priority. When a damaged vessel(s), shore side facility or pipeline poses a risk of an imminent major discharge, then preventative action to mitigate the size of the spill is the logical first priority, i.e. stabilize and lighter a vessel; contain and secure the shore-based source.

Open Water Containment and Recovery: Once the effort is underway to secure the source, containment and recovery of the spilled oil prior to shoreline impact is the next logical priority. Deploy major recovery vessels, boom-towing vessels and other skimmers to intercept oil before it impacts critical areas or becomes a more costly and environmentally damaging shoreline cleanup problem.

Protection of Sensitive Areas; Depending on the ability to contain and collect spilled oil prior to impact, the protection of resources can compete with containment and collection resources. Priority for protecting these areas is a function of the value of the areas, (as prioritized in section 3610 and 3620) and the feasibility of protecting them. Dedicating open water containment equipment to protecting these areas is not wise if oil that would otherwise have been recovered is merely free to strike other sensitive areas that have not been 'prophylactically' boomed. In general, employ tactics that do not weaken open water recovery operations; deploy resources that are not needed in the open water operations; relocate threatened wildlife by means such as capturing, or scaring with propane noise making cannons and closing off narrow channels with sediment dikes, boom, siphon dams or other natural or man-made materials.

Shoreline Cleanup: Shoreline cleanup should be undertaken only when the risk of recontamination from floating oil passes. Pre-cleaning the beaches of trash and debris prior to the impact of the oil can greatly facilitate the cleanup. The UC must decide if shorelines are going to be cleaned at each tidal change or just once after all the oil anticipated to reach land has come ashore.

The preservation of human life and health shall be the overriding priority for any response to a discharge of oil. There are two elements to this principle; public safety and response personnel safety.

A large release of oil in the vicinity of houseboats, inhabited shoreline areas or at an oil transfer facility could pose a health or explosion hazard, especially if the discharge is in a confined area (e.g. under a dock). Benzene, hydrogen sulfide and other toxic, explosive or oxygen-displacing vapors could be generated. Evacuation of the area, even at the expense of delaying the cleanup, may be necessary until the danger has passed. Evacuation of homes or other public and private facilities, if recommended by the Unified Command (UC), is the responsibility of state and local emergency agencies.

All response personnel must comply with all applicable worker health and safety laws and regulations as discussed in Section 9334. Initial response and rescue personnel, who may be underway on self-propelled skimmers and other vessels, and shoreline cleanup personnel could be exposed to health and safety risk(s). Personnel safety is paramount and responders shall comply with the guidelines set forth in section 5600 of this plan and the site safety plan(s) generated by the UCS.

After the threat to personnel safety has been eliminated or reduced to safe levels, response strategies should be implemented to minimize the ecological impact and then the economic and public impact as discussed in the following section.

4510 Protection Strategies

In general, protection of the environmentally sensitive areas that could be impacted will receive a higher priority than economically significant sites. This hierarchy was established in the ranking of the environmentally sensitive sites as A, B & C and the economically significant sites as D, E, & F with the highest priority being A (section 3610). However, as mentioned before, resources and sites determined to be critical to the preservation of human health and safety, such as drinking water intakes, power plant intakes and desalinization plants afford first priority, ahead of an environmentally sensitive site.

The Unified Command will make the final decision regarding protection priorities for the environmentally sensitive and economically significant areas. In order to further assist the UC, additional prioritization of equally categorized areas that could be impacted may, in the future, be included in this plan. This will allow the UC to determine which priority sites are to be protected when initial resources will only allow the protection of a few of them.

The UC may utilize the predetermined response strategies for environmentally sensitive sites and economically significant sites. The UC must decide which sites are in jeopardy of being oiled and the response strategy should be implemented as indicated in the response strategy site summary sheets included in section 3610. However, the UC and the responders should remain flexible and be receptive to additional information when instituting the booming plan or other countermeasures. Factors such as unusually high winds, strong tidal currents or freshets, equipment limitations, bottom conditions and the type of oil can have a significant effect on the proposed strategy. Modifications to the preplanned strategies should be expected.

In addition to the seasonal variances, the protection priority of an entire area could foreseeably be changed. For example, if the SSC or a DFG biologist determine that a certain section of marshland or coastline, previously categorized as a lower priority (or not categorized at all), is currently a breeding ground for an endangered species, then protection of that site may be afforded the utmost priority even at the expense of a previously categorized A site located adjacent to it.

4520 Containment Strategies

Before spilled oil can be effectively recovered, the spreading of the oil must be controlled and the oil contained in an area accessible to oil recovery devices. In this section various oil containment strategies are discussed. Generally, spilled oil is contained using oil containment boom. Typical boom has a flotation section that provides a barrier on and above the water surface and a skirt section that provides a barrier below the water surface. The physical dimensions of the boom to be used for a particular spill will be dependent on local conditions. In the open ocean it may be necessary to use a boom that is several feet tall. In a protected marsh, a boom that is only a few inches tall may be appropriate.

There are limitations on the effectiveness of any boom. Oil will be lost if the conditions are such that there is splash over from breaking waves. Oil will also be carried under the boom if it is deployed in such a way that currents cause the oil to impact the boom with a velocity perpendicular to the boom of greater than 0.7 knots. Once a boom has been deployed, it may be necessary to reposition it due to changing tides and currents. It is desirable to have personnel available to readjust the boom as required. In all cases of boom deployment, consideration must be given to protecting the safety of those involved in the activity.

Open Water Containment: Oil spilled on open water is normally contained using boom. The boom will be deployed using vessels that will tow the boom around the perimeter of the oil spill. The type of boom to be deployed will depend on local conditions, including Sea State, tides, currents and wind. To be most effective, booming on open water must be done as soon as possible after a spill.

Protective Booming: The goal of most oil containment and recovery strategies is to collect the spilled oil from the water and prevent it from reaching sensitive resources. Frequently, however, this is not possible and sensitive resources are oiled in spite of response efforts, especially during large oil spills. Often the goal will be to minimize environmental injury using a variety of booming, containment and recovery techniques. The following are techniques that can be implemented by the Booming Branch of the UCS' Operations section for containing spilled oil on water or as a means to direct it away from sensitive natural resources or cultural amenities. Shoreline cleanup and treatment methods are discussed in more detail in section 4530.

Exclusionary booming is performed prior to the advance of the oil and is used to prevent or exclude oil from entering a harbor inlet, slough, marsh or estuary. Either skirted or sorbent boom can be used for this type of booming. Factors that need to be considered are: type and size of boom, natural outflow of the body of water, wind, tide and currents or a combination of both. These factors can be predetermined by establishment of a priority system, training and local knowledge of underwater topography, weather conditions and boom anchoring capabilities. It is important to remember that the boom needs to be tended and monitored as weather and tidal conditions can change.

Diversionary booming should be set so that oil movement is reduced to under 0.7 knots. This can be accomplished by angling the boom in relation to the current's direction, reducing the velocity of the floating oil in relation to the boom. Diversionary or deflection booms can be set up in series along a waterway to increase their effectiveness. As stated before, the boom(s) needs to be tended and monitored as weather and tidal conditions can change.

Containment booming is used to prevent spreading and to concentrate the oil so it can be skimmed or vacuumed. Factors that need to be considered are: type and size of boom required for weather, winds, tides and currents in the vicinity of potential spill areas; the type of deployment vessel needed; the amount

of boom needed for effective containment and available skimming capabilities. Fixed or natural anchor points should be selected. These factors can be predetermined by emphasizing worst case spill scenarios and using local knowledge of weather and sea conditions.

Sorbent booming is useful when the amount of oil is minimal, when tides and currents are light, or when shorelines require protection. Heavier oil can be recovered using adsorbents (oil "sticks" to material) and lighter fuels generally are recovered using absorbents (sausage, sweep, or diapers). Sorbent booming can also be used as a backup for other types of booming to recover product that may have entrained past the primary barrier.

Factors that need to be considered are wind and wave action; type of sorbent required, i.e., rocky or sandy shoreline, marsh area, etc.; and type and viscosity of product to be recovered.

Berms and Dams: Coastal shores are barriers to spreading oil. Temporary berms, dikes and dams can also serve as effective barriers against oil contamination of sensitive natural resources and economic amenities. Berms, dikes and dams are simply another form of booming and are subject to the same environmental stresses. The appropriate protection technique for a particular shore depends on several factors:

- water body type (open water, bay, tidal channel, inlet)
- water current velocity
- water depth
- wave height
- shore type (sand, gravel, boulder)

Generally, sediment berms, dikes and dams will most often be used to protect small coastal inlets or perhaps tidal channels serving wetlands and marshes when these channels are accessible. The object of berms, dikes and dams is to keep oil outside an inlet because there are often abundant natural resources and economically significant areas that use the sheltered waters of bays and estuaries within. Occasionally, dikes and dams have been used across a channel to contain the oil within a portion of marsh in order to prevent widespread contamination of other resources.

Dikes and dams are not practical when currents are great, waters are deep and waves are large. Also, beaches with abundant sand are generally the most suitable for building dikes and dams. Berms can be built above the active beach face to prevent oil contamination of high beach during spring tides. Alternative strategies should be prepared and the necessary supplies and equipment in place should a berm, dike, or dam fail.

4530 Recovery Strategies

4530.1 **Introduction**: Oil spilled in open water spreads quickly and weathers rapidly. Often, rough wind and sea conditions will be contributing factors to the cause of the spill and these same conditions will preclude response and deployment of surface equipment or minimize their effectiveness. Such conditions may cause the oil to be dispersed in the water column, evaporated into the atmosphere, and/or transported away from sensitive areas and resources. These conditions may prescribe a decreased response with an action plan that allows a natural "weathering and cleansing" process. If possible, however, an active response must be undertaken in order to remove oil from the environment and thereby reduce the threat to sensitive natural resources.

Usually a series of successive strategies are necessary and appropriate for any spill. Each set of environment and situational conditions limit the array of possible useful strategies. Omission of any appropriate strategy can have severe results. So, it is very important that every effort be given to implementation of the strategies described.

Mechanical control and recovery countermeasures are most effective immediately after a spill when the oil is in a thick layer, and covers a small area. When oil is spilled in or allowed to escape to open water, the possibility of containment and recovery is at the mercy of the weather and sea conditions. Booms and skimmers are most effective in calm waters but can work during moderate weather and sea conditions. When the open water is rough, booms and skimmers be come ineffective and containment by become impossible. Rough conditions speed the rate of spreading, resulting in diminishing opportunity for open water recovery However, when the ocean is rough, booms and skimmers become ineffective.

In bays like San Francisco and Humboldt, tidal mixing is so dramatic that once oil reaches open water, which is under strong tidal influence, a spill in any arm will rapidly spread throughout the bay. Sites. This rapid spread reduces on-water collection effectiveness. Also, as oil spreads it threatens and impacts an increasingly wider number of resources and sensitive sites.

4530.2 **The On-Water Recovery Branch** is in the Operations Section of the Unified Command System. The On-Water Recovery Branch reports to the Operations Section Chief. Major responsibilities are as follows:

-Implement assigned portion of spill action plan to contain and recover spilled oil.

-Request needed resources and assign to group supervisors.

-Maintain ship to shore communications.

-Provide situation and resource status information to the Operations Section

-Coordinate activities with Shoreline Cleanup and Booming Branches

-Report all events and accidents to the Operations Section Chief.

-Evaluate the performance of containment and recovery equipment.

-Participate in strategy development with Planning and Logistics Sections.

4530.3 **Offshore/Open Water Operations**: Oil removal/recovery in open water is accomplished through the use of skimming devices once the oil has been contained. Skimmers can be freestanding in which the skimmer is a separate piece of equipment which pumps the oil-water mixture from the contained surface into tanks on a vessel. These skimmers are usually driven by hydraulic units on board a vessel. Self-propelled skimmers have a skimmer as an integral part of the vessel. The skimming vessel positions itself at the head of a concentrated or contained pool of oil and recovers the oil into tanks on board the vessel. There is also a type of skimmer in which the weir or collection zone of the skimmer is an integral part of the boom that is in contact with the oil. The pumping and oil collection is done on the vessel that is close to the weir skimmer.

"Vessels of opportunity", such as fishing vessels, may be used to deploy or tow boom and, depending on their size, be equipped with skimming equipment. They need to have adequate deck space and lifting cranes to carry the necessary equipment. The Coast Guard's Vessel of Opportunity Skimming System (VOSS) could be deployed on a variety of vessels.

To be most effective, oil spill recovery equipment must be directed to the location of the thickest oil accumulation. Observers on vessels at water level are unable to see a vast area and are unable to recognize the most optimum skimming locations. Skimming activities are best directed by trained observers aloft in helicopters. One observer may be able to direct several skimming units to optimum skimming locations. During hours of darkness or poor visibility, tracking devices that emit radiolocation signals can be placed in the spilled oil to trace the oil movement. Remote sensing systems have been developed which can track oil movement even in darkness and poor visibility. The sensor is mounted in an aircraft that overflies the spill area. The sensor systems include Side Looking Airborne Radar (SLAR), infrared and radiometric.

4530.4 **Nearshore/Shallow Water***:* Oil recovery techniques and equipment are different in near-shore/shallow water locations than open water. Shallow draft vessels and smaller boom and skimmers are used in these situations. These vessels can maneuver into tight places behind and under wharves or in sloughs and can actually skim next to shore in many near-shore locations.

Strategies for near-shore cleanup can differ depending on the depth of the water and the location. Near-shore operations, within a bay or inlet, will also require shallow draft vessels, work boats and skimmers. However, the vessels may only be operable at high tide. At or near low tide, the operation may evolve into a shoreline cleanup operation. Any boom towing boats or skimmers must be able to withstand going aground without sustaining major damage.

Coastal shallow water or near-shore strategies will differ in certain respects. In addition to the need for small, shallow draft vessels, specialized vessels such as kelp cutters and harvesters may also be needed. California's rocky coast can make near-shore operations difficult and even dangerous during high surf and winter conditions. Once again, the safety of personnel involved in these operations is the Unified Command's paramount concern.

Weir Skimmers: These skimmers recover oil by aligning a barrier just below the surface of the water and having oil floating on the water surface pass over the weir into a recovery box or into a pump. Weir skimmers are not the most efficient recovery systems because a large amount of water is usually collected along with the recovered oil.

Vortex Skimmers: In a vortex skimmer, a turbine-like fan, mounted below the surface, is used to create a current that draws in oil floating on the water. It is then pumped to a collection tank. The device is mounted on a vessel or floats at the water surface.

Sorption/Oleophilic Skimmers: This type of skimmer uses materials that will retain a high percentage of oil minimizing the amount of water collected with the oil. The skimming devices can be belts, ropes, brushes or discs that come in contact with the oil. The device then will either wring or scrape the oil from the material into a collection point for removal to a storage tank.

Suction Skimmers: These devices operate in conjunction with a pump that draws liquid into the skimming device. The skimmer head generally floats on the water with an oil/water mixture being

drawn into the skimmer. A typical application would include a skim head used with a truck mounted vacuum system.

Suction dredges are rarely used to recover oil or oiled sediments from the bottom of a water body because oil usually does not sink or, if it does, the amount is small and not recoverable. There are exceptions, however. Whether an oil sinks or floats depends primarily on the specific gravity of the oil and the temperature and salinity of the water. Oil may also sink once it is adsorbed to exposed sediment like sand or gravel, which is subsequently mobilized and redeposited in deeper water.

If dredging is considered as a recovery technique, there must be provision for containment and storage of large quantities of water recovered along with the oil or oiled sediment. A large quantity of oil contaminated water can present significant storage, transport, and disposal problems which must be resolved before the activity is begun. These problems can be diminished if oil/water separation is provided, and state and federal agencies allow decanting of water back to the containment area.

Dredging can be coupled with low-volume, low pressure washing of the bottom to direct the sunken oil down-gradient to some collection point where a dredge can recover the accumulated oil. Currents and flow patterns may cause the sunken oil to naturally collect in low spots that can serve this same purpose. The use of a hopper barge's inverted draghead as a weir skimmer was fairly successful in Prince William Sound and could be employed in calm seas.

Vacuum trucks are frequently essential equipment for cleanup of oil spills. A hose is extended from the truck to the oil collection or containment site to pick up the oil. If the oil is floating on water, the suction hose can be connected to a "duck bill" nozzle that has a long horizontal slot to allow the oil to be picked up while minimizing the amount of water collected. A weir-type skimmer can also be connected to the suction hose to suck the thin layer of oil from the surface and minimize the amount of water collected at the same time. Both methods require a full-time attendant to adjust the equipment and clear debris.

Vacuum trucks work best when the oil layer is thick. If there is only a thin layer of oil on the water, much more water will be collected than oil. Recovery of a large quantity of water can make a vacuum truck operation very inefficient because the tank will quickly fill with water and little oil. Transport and disposal costs increase as a result. The operation can be made more efficient if the oil/water mix recovered is allowed to separate in the tank and the water decanted back to the containment area. Decanting can be approved by the UC according to state law.

4530.5 Shoreline Cleanup

Shoreline Types:

The most obvious differences between shorelines along the California coast are due to their geomorphology. These geomorphological differences are caused by their exposure to different quantities of water and wind driven forces of shoreline energy (specifically waves and currents) and the shoreline type (substrate, grain size, tidal elevation, origin). The geomorphology and the degree of exposure to waves and currents combine to influence the plants and animals that inhabit the intertidal and shallow subtidal areas of the shoreline and the natural persistence of stranded oil. It is these same factors that provide the criteria to determine the appropriate shoreline cleanup techniques.

These concepts were the basis for development of the Environmental Sensitivity Index (ESI) by the Research Planning Institute (RPI), which ranks shorelines according to their sensitivity to oiling and shoreline cleanup activity. The ESI provides a useful first step in the design of contingency plans because it enables the ready identification of priority areas for protection from oiling and determination of appropriate shoreline cleanup methods during response activities. Summarized, the ESI ranges from 1 (least sensitive to oil) to 10 (most sensitive to oil). Detailed descriptions of the ESI shoreline types and likely oil impacts can be found in the National Oceanic & Atmospheric Administration (NOAA) Shoreline Assessment Manual at: http://response.restoration.noaa.gov/shor_aid/shor_aid.html

Shoreline types are ranked as follows:

RANK	SHORE	(NOAA ESI Map Shore Type)
1	Exposed Rocky Shores	(1a)
2	Exposed Solid Man-made Structures	(1b)
3	Exposed Wave-cut Platforms	(2a)
4	Sand Beaches	(3 & 4)
5	Mixed Sand and Gravel Beaches	(5)
6	Gravel Beaches	(6a)
7	Riprap	(6b)
8	Exposed Tidal Flats	(7)
9	Sheltered Rocky Shores	(8a)
10	Sheltered Solid Man-made Structures	(8b)
11	Sheltered Tidal Flats	(9a)
12	Salt to Brackish Marshes	(10a)

4530.6 Shoreline Cleanup:

Under certain conditions it will be appropriate to take actions to remediate the effects of stranded oil on shorelines. Other conditions may dictate that no actions should be taken. The primary goal of the implementation of any shoreline countermeasure is the removal of oil from the environment with no further injury or destruction to that environment. A list of the 21 different countermeasures is provided. These 21 countermeasures, including natural recovery, have been evaluated for the appropriateness of their use on five different major categories of petroleum products (very light, light, medium, heavy, non-floating) stranded on ten shoreline types. The results of these evaluations are presented on five matrices attached at the end of this section. These matrices are intended to be used as a planning guide by the Shoreside Recovery Group of the Operations Section.

The countermeasures listed may not be the best for use under all possible circumstances, and multiple countermeasures may need to be used on the same shoreline. Selection of specific countermeasures for use during a spill response will be based on the properties off the stranded oil, the degree of contamination, the shoreline type, and the presence of sensitive natural resources. The Federal On-Scene Coordinator or the State On-Scene Commander has the authority to select or approve specific countermeasures for use during an oil spill response.

4530.8 Potential Shoreline Treatment Methods:

The following section lists and describes those techniques, which may be required for use during a shoreline cleanup. Methods and equipment currently in use for these shoreline treatment methods are described in more detail in the Shoreline Assessment Manual. These methods, when used according to

the guidelines in this document, may be used on most sites as part of the UC-directed response. It should be noted that methods noted with an (*) will require special consideration and authorization by the natural resource trustee prior to commencement of work. The trustee agency(s) for fish and wildlife resources will make the final recommendations to the Unified Command on which specific method(s) to employ on a case-by-case basis. Regardless of this decision, contingency plans should provide for an array of identified methods to be used. Currently approved methods are:

1. Natural Recovery
2. Barriers/Berms
3. Manual Oil Removal/Cleaning
4. Mechanical Oil Removal
5. Sorbents
6. Vacuum
7. Debris Removal
8. Sediment Reworking/Tilling *
9. Vegetation Cutting/Removal
10. Flooding (deluge)
11. Low Pressure, Ambient Water Flush (<50 psi)
12. High Pressure, Ambient Water Flush (50-100 psi)
13. Low Pressure, Hot Water (<50 psi)
14. High Pressure, Hot Water (50-100 psi)
15. Steam Cleaning
16. Sand Blasting
17. Solidifiers *
18. Shoreline Cleaning Agents *
19. Nutrient Enrichments *
20. Natural Microbe Seeding *
21. *In-situ* Burning *

A description of each shoreline cleanup method is discussed below:

1. NATURAL RECOVERY

Objective: No attempt is made to remove any stranded oil, when there is no effective method for cleanup or to minimize impact to the environment. Oil is left to degrade naturally.

Description: No action is taken, although monitoring of contaminated areas is required.

Applicable Habitat Types: All habitat types.

When to Use: When natural removal rates are fast (e.g., gasoline evaporation or high energy coastlines), when the degree of oiling is light, access is severely restricted or dangerous to cleanup crews, or when cleanup actions will do more harm than natural removal.

Biological Constraints: This method may be inappropriate for areas used by high numbers of mobile animals (birds, marine mammals) or endangered species.

Environmental Effects: Same as from the oil alone.

Waste Generation: None.

2. BARRIERS/BERMS

Objective: To prevent entry of oil into a sensitive area or to divert oil to a collection area.

Description: A physical barrier other than a boom is placed across an area to prevent oil from passing through into sensitive habitats. Barriers can consist of earthen berms or filter fences. When it is necessary for water to pass because of water volume, underflow or overflow dams are used.

When to Use: When the oil threatens sensitive habitats, and other barriers are not feasible. To protect sensitive areas when cleaning adjacent shorelines.

Applicable Habitat Types: At the mouths of creeks or streams to prevent oil from entering from offshore, or to prevent oil from being released from the creek into offshore waters. Also, on beaches where a high berm can be built above the high-tide line to prevent oil from over-washing the beach and entering a sensitive back-beach habitat (e.g. lagoon).
Environmental Effects: May disrupt or contaminate sediments and adjacent vegetation. The natural beach or shore profile should be restored (may take weeks to months on gravel beaches).

Biological Constraints: Responders must minimize disturbance to sensitive areas, such as shorebird nesting sites on beaches. Placement of dams and filter fences could cause excessive physical disruptions to the site, particularly in wetlands.

Waste Generation: Sediment barriers will become contaminated on the oil side and filter fence materials will have to be disposed of as oily wastes.

3. MANUAL OIL REMOVAL/CLEANING

Objective: To remove oil with hand tools and manual labor.

Description: Removal of surface oil with hands, rakes, shovels, buckets, scrappers, sorbents, pitchforks, etc., and placing in containers. No mechanized equipment is used. Includes underwater recovery of submerged oil by divers with hand tools, for example.

Applicable Habitat Types: Can be used on all habitat types.

When to Use: Light to moderate oiling conditions for stranded oil or heavy oils that have formed semi-solid to solid masses that can be picked up manually.

Biological Constraints: Foot traffic over sensitive areas (wetlands, tidal pools, etc.) should be restricted or prevented. There may be periods when shoreline access should be avoided, such as during bird nesting.

Environmental Effects: Minimal, if surface disturbance by crew movement and waste generation is controlled.

Waste Generation: May generate significant quantities of oil mixed with sediment, which must be properly disposed of or treated. Decontamination of hand tools may produce oily wastewater that must be treated properly. Worker personal protective gear is usually disposed of daily or decontaminated and the resulting oily wastewater treated properly.

4. MECHANICAL OIL REMOVAL

Objective: To remove oil from shorelines and bottom sediments with mechanical equipment.

Description: Oil and oiled sediments are collected and removed using mechanical equipment such as backhoes, graders, bulldozers, dredges, draglines, etc. Requires systems for temporary storage, transportation, and final treatment and disposal.

Applicable Habitat Types: On land, wherever surface sediments are both amenable to and accessible to heavy equipment. For submerged oil, used in sheltered areas where oil accumulates. On water, used on viscous to solid oil.

When to Use: When large amounts of oiled materials must be removed. Care should be taken to remove sediments only to the depth of oil penetration, which can be difficult when using heavy equipment. Should be used carefully where excessive sediment removal may cause erosion.

Biological Constraints: Heavy equipment may be restricted in sensitive habitats (e.g., wetlands, soft substrate) or areas containing endangered species. Will need special permission to use in areas with known cultural resources. Dredging in seagrass beds or coral reef habitats may be prohibited. The noise generated by the mechanical equipment may also be a constraint.

Environmental Effects: The equipment is heavy, with many support personnel required. May be detrimental if excessive sediments are removed without replacement. All organisms in the sediments will be affected, although the need to remove the oil may make this response method the best overall alternative. Resuspension of exposed oil and fine-grained oily sediments can affect adjacent bodies of water.

Waste Generation: Can generate significant quantities of contaminated sediment that must be cleaned or landfilled. The amount of waste generated by this cleanup option should be given careful consideration by response planners when reviewing potential environmental impacts of the oily wastes, debris, and residues.

5. SORBENTS

Objective: To remove surface oil by absorption onto oleophilic (oil-attracting) material placed in water or at the waterline.

Description: Sorbent material is placed *on the floating oil or water surface* to allow it to sorb oil, or alternatively, the material can be used to wipe or dab stranded oil. Forms include sausage boom, pads, rolls, sweeps, snares, and loose granules or particles. These products can be either synthetic or natural substances. Efficacy depends on the capacity of the particular sorbent, energy available for lifting oil off the substrate, and stickiness of the oil. Recovery of all sorbent material is mandatory. Loose particulate sorbents must be contained in a mesh or other material.

Applicable Habitat Types: Can be used on any habitat or environment type.

When to Use: When oil is free-floating close to shore or stranded on shore. The oil must be able to be released from the substrate and absorbed by the sorbent. Often used as a secondary treatment method after gross oil removal and in sensitive areas where access is restricted. Selection of sorbent varies by oil type; heavy oils only coat surfaces, requiring a high surface area to be effective, whereas lighter oils can penetrate sorbent material.

Biological Constraints: Access for deploying and retrieving sorbents should not be through soft or sensitive habitats or affect wildlife. Sorbent use should be monitored to prevent overuse and generation of large volumes of waste. Sorbents should not be used in a fashion that would endanger or trap wildlife. Sorbents left in place too long can break apart and present an ingestion hazard to wildlife.

Environmental Effects: Physical disturbance of habitat during deployment and retrieval. Improperly deployed or tended sorbent material can crush or smother sensitive substrates.

Waste Generation: Sorbents must eventually be collected for proper disposal so care should be taken to select and use sorbents properly, and prevent generation of large amounts of lightly-oiled sorbents. Recycling should be emphasized rather than disposal.

6. VACUUM

Objective: To remove oil pooled on a shoreline substrate or subtidal sediments.

Description: A vacuum unit is attached via a flexible hose to a suction head that recovers free oil. The equipment can range from small, portable units that fill individual 55-gallon drums to large supersuckers that are truck- or vessel-mounted and can generate enough suction to lift large rocks. Removal rates from substrates can be extremely slow.

Applicable Habitat Types: Any accessible habitat type. May be mounted on barges for water-based operations, on trucks driven to the recovery area, or hand-carried to remote sites.

When to Use: When oil is stranded on the substrate, concentrated in trenches or trapped in vegeta-tion. Usually requires shoreline access points.

Biological Constraints: Special restrictions should be established for areas where foot traffic and equipment operation may be damaging, such as soft substrates. Operations in wetlands need to be very closely monitored, with a site-specific list of restrictions developed to prevent damage to vegetation.

Environmental Effects: Minimal, if foot and vehicular traffic is controlled and minimal substrate is damaged or removed.

Waste Generation: Collected oil and or oil/water mix will need to be stored temporarily prior to recycling or disposal. Oil may be recyclable; if not, it will require proper disposal. Large amounts of water are often recovered, requiring separation and treatment.

7. DEBRIS REMOVAL

Objective: To remove contaminated debris from the shoreline or water surface.

Description: Manual or mechanical removal of debris from the shore or water surface. Can include cutting and removal of oiled logs.

Applicable Habitat Types: Can be used on any habitat or environment type where access is safe.

When to Use: When driftwood and debris are heavily contaminated and provide a potential source of chronic oil release. When it may create aesthetic problems, be a source of contamination for other

resources in the area, cause clogging problems in the skimmer, or create safety problems for responders. Used in areas of debris accumulation on beaches prior to oiling to minimize the amount of oiled debris to be handled.

Biological Constraints: Foot traffic over sensitive areas (wetlands, spawning grounds) needs to be restricted. May be periods when access should be restricted (spawning periods, influx of large numbers of migratory waterbirds).

Environmental Effects: Physical disruption of substrate, especially when mechanized equipment must be deployed to recover a large quantity of debris.

Waste Generation: Will generate contaminated debris (volume depends on what, and how much, is collected, e.g., logs, brush). Unless there is an approved hazardous waste incinerator that will take oily debris, burning will seldom be allowed especially on-site burning. However, this option should still be explored, especially for remote locations, with the appropriate state or federal agencies that must give approvals for burning.

8. SEDIMENT REWORKING/TILLING

Objective: To enhance the rate of degradation, by breaking up oily sediments and surface oil deposits, increasing the surface area, and mixing deep subsurface oil layers to the surface.

Description: The oiled sediments are roto-tilled, disked, or otherwise mixed using mechanical equipment or manual tools. Along beaches, oiled sediments may also be pushed to the water's edge (surf washing) to enhance natural cleanup by wave activity. The process may be aided with high-volume flushing of gravel.

Applicable Habitat Types: On any sedimentary substrate that can support mechanical equipment or foot traffic.

When to Use: On sand to gravel beaches with subsurface oil, where sediment removal is not feasible (due to erosion or disposal problems). On sand beaches, where the sediment is stained or lightly oiled, appropriate where oil is stranded above normal high waterline.

Biological Constraints: Avoid use on shores near sensitive wildlife habitat, such as fish-spawning areas or bird-nesting or concentration areas because of the potential for release of oil and oiled sediments into adjacent bodies of water. Should not be used in shellfish beds.

Environmental Effects: Due to the mixing of oil into sediments, this method could further expose organisms that live below the original layer of oil. Repeated mixing over time could delay reestablishing organisms. Refloated oil from treated sites could contaminate adjacent areas.

Waste Generation: None.

9. VEGETATION CUTTING/REMOVAL

Objective: To remove portions of oiled vegetation or oil trapped in vegetation to prevent oiling of wildlife or secondary oil releases.

Description: Oiled vegetation is cut with weed-wackers, blades, etc., and picked or raked up and bagged for disposal.

Applicable Habitat Types: Habitats composed of vegetation such as wetlands, seagrass beds, and kelp beds.

When to Use: When the risk of oiled vegetation contaminating wildlife is greater than the value of the vegetation that is to be cut, and there is no less-destructive method that removes or reduces the risk to acceptable levels.

Biological Constraints: Operations must be strictly monitored to minimize the degree of root destruction and mixing of oil deeper into the sediments. Access in bird-nesting areas should be restricted during nesting seasons. Cutting only the oiled portions of the plants and leaving roots and as much of the stem as possible minimizes impact to plants.

Environmental Effects: Vegetation removal will destroy habitat for many animals. Cut areas will have reduced plant growth, and in some instances, plants may be killed. Cutting at the base of the plant stem may allow oil to penetrate into the substrate, causing subsurface contamination. Along exposed sections of shoreline, the vegetation may not recover, resulting in erosion and habitat loss. Trampled areas will recover much more slowly.

Waste Generation: Cut portions of oiled plants must be collected and disposed.

10. FLOODING

Objective: To wash oil stranded on the land surface to the water's edge for collection. Description: A perforated header pipe or hose is placed above the oiled shore or bank. Ambient-temperature water is pumped through the header pipe at low pressures and flows downslope to the water. On porous sediments, water flows through the substrate, pushing loose oil ahead of it, or floating oil to the water's surface and transporting the oil down the slope for pickup. On saturated, fine-grained sediments, the technique becomes more of a flushing of the surface.

Applicable Habitat Types: All shoreline types where the equipment can be effectively deployed. This is non effective in steep intertidal areas.

When to Use: In heavily oiled areas when the oil is still fluid and adheres loosely to the substrate, and where oil has penetrated into gravel sediments. This method is frequently used with other washing techniques (low- or high-pressure, cold-to-hot-water flushing).

Biological Constraints: Special care should be taken to recover oil where nearshore habitats contain rich biological communities. Not appropriate for muddy substrates.

Environmental Effects: Habitat may be physically disturbed by foot traffic during operations and smothered by sediments washed down the slope. Oiled sediment may be transported to shallow, nearshore areas, contaminating them and burying benthic organisms.

Waste Generation: Depends on the effectiveness of the collection method.

11. LOW-PRESSURE, AMBIENT-WATER FLUSHING

Objective: To remove fluid oil that has adhered to the substrate or man-made structures, pooled on the surface, or become trapped in vegetation.

Description: Ambient-temperature water is sprayed at low pressures (<10 psi), usually from hand-held hoses, to lift oil from the substrate and direct it to the water's edge for recovery by skimmers, vacuum, or sorbents. Can be used with a flooding system to prevent released oil from re-adhering to the substrate down-stream of the treatment area.

Applicable Habitat Types: On substrates, riprap, and solid man-made structures, where the oil is still fluid. In wetlands and along vegetated banks where oil is trapped in vegetation.

When to Use: Where fluid oil is stranded onshore or floating on shallow intertidal areas.

Biological Constraints: May need to restrict use so that the oil/water effluent does not drain across Sensitive, intertidal habitats and mobilized sediments do not affect rich subtidal communities. Use from boats will reduce the need for foot traffic in soft substrates and vegetation. Flushed oil must be recovered to prevent further oiling of adjacent areas.

Environmental Effects: If containment methods are not sufficient, oil and oiled sediments may be flushed into offshore areas. Some trampling of substrate and attached biota will occur.

Waste Generation: Depends on the effectiveness of the collection method.

12. HIGH-PRESSURE, AMBIENT-WATER FLUSHING

Objective: To remove oil that has adhered to hard substrates of man-made structures.

Description: Similar to low-pressure flushing except that water pressure is 100-1,000 psi. High-pressure spray will more effectively remove sticky or viscous oils. If low-water volumes are used, sorbents are placed directly below the treatment area to recover oil.

Applicable Habitat Types: On bedrock, man-made structures, and gravel substrates.

When to Use: When low-pressure flushing is not effective at removing adhered oil that must be removed to prevent continued oil release or for aesthetic reasons. When a directed water jet can remove oil from hard-to-reach sites.

Biological Constraints: May have to restrict flushing so that the oil does not drain across sensitive habitats. Flushed oil must be recovered to prevent further oiling of adjacent areas. Attached animals and plants in the direct spray zone will be removed.

Environmental Effects: May drive oil deeper into the substrate or erode shorelines of fine sediments if water jet is improperly applied. If containment methods are not sufficient, oil and oiled sediments may be flushed into offshore areas. Some trampling of substrate and attached biota will occur.

Waste Generation: Depends on the effectiveness of the collection method.

13. LOW-PRESSURE, HOT-WATER FLUSHING

Objective: To remove non-fluid oil that has adhered to the substrate or man-made structures, or pooled on the surface.

Description: Hot water (90.F up to 170.F) is sprayed with hoses at low pressures (<10 psi) to liquefy and lift oil from the substrate and direct it to the water's edge for recovery by skimmers, vacuums, or sorbents. Used with flooding to prevent released oil from re-adhering to the substrate.

Applicable Habitat Types: On bedrock, sand to gravel substrates, and man-made structures.

When to Use: Where heavy, but relatively fresh oil is stranded onshore. The oil must be heated above its pour point, so it will flow. This is less effective on sticky oils.

Biological Constraints: Avoid wetlands or rich intertidal communities so that hot oil/water effluent does not contact sensitive habitats. Operations from boats will help reduce foot traffic in soft substrates and vegetation. Flushed oil must be recovered to prevent further oiling of adjacent areas.

Environmental Effects: Hot-water contact can kill all attached animals and plants. If containment methods are not sufficient, oil may be flushed into downstream areas. Some trampling of substrate and biota will occur.

Waste Generation: Depends on the effectiveness of the collection method.

14. HIGH-PRESSURE, HOT-WATER FLUSHING

Objective: To mobilize weathered and viscous oil strongly adhered to surfaces.

Description: Hot water (90 degrees F [30 degrees C] up to 170 degrees F [70 degrees C]) is sprayed with hand-held wands at pressures greater than 100 psi (720 kpa). If used without water flooding, this procedure requires immediate use of vacuum or sorbents to recover the oil/water runoff. When used with a flooding system, the oil is flushed to the water surface for collection by skimmers, vacuum, or sorbents.

Applicable Habitat Types: Gravel substrates, bedrock, and man-made structures.

When to Use: When oil has weathered to the point that warm water at low pressure no longer effectively removes oil. To remove viscous oil from man-made structures for aesthetic reasons.

Biological Constraints: Use should be restricted so that the oil/water effluent does not drain across sensitive habitats (damage can result from exposure to oil, oiled sediments, and hot water). Should not be used directly on attached algae nor rich, inter-tidal areas. Released oil must be recovered to prevent further oiling of adjacent areas.

Environmental Effects: All attached animals and plants in the direct spray zone will be removed or killed, even when used properly. Oiled sediment may be transported to shallow nearshore areas, contaminating them and burying benthic organisms.

Waste Generation: Depends on the effectiveness of the collection method.

15. STEAM CLEANING

Objective: To remove heavy residual oil from solid substrates or man-made structures.

Description: Steam or very hot water (171 degrees F [77 degrees C] to 212 degrees F [100 degrees C]) is sprayed with hand-held wands at high pressure (2000+ psi [14,400 kpa]). Water volumes are very low compared to flushing methods.

Applicable Habitat Types: Man-made structures such as seawalls and riprap.

When to Use: When heavy oil residue must be removed for aesthetic reasons, and when hot-water flushing is not effective and no living resources are present.

Biological Constraints: Not to be used in areas of soft substrates, vegetation, or high biological abundance directly on, or below, the structure.

Environmental Effects: Complete destruction of all organisms in the spray zone. Difficult to recover all released oil.

Waste Generation: Depends on the effectiveness of the collection method. Usually sorbents are used, generating significant waste volumes.

16. SAND BLASTING

Objective: To remove heavy residual oil from solid substrates or man-made structures.

Description: Use of sandblasting equipment to remove oil from the substrate. May include recovery of used (oiled) sand in some cases.

Applicable Habitat Types: On heavily oiled bedrock, artificial structures such as seawalls and riprap.

When to Use: When heavy oil residue must be cleaned for aesthetic reasons, and even steam-cleaning is not effective.

Biological Constraints: Not to be used in areas of soft substrate, vegetation, or high biological abundance directly below, or adjacent to, the structures.

Environmental Effects: Complete destruction of all organisms in the blast zone. Possible smothering of downstream organisms. Unrecovered, used sand will introduce oiled sediments into the adjacent habitat.

Waste Generation: Will need to recover and dispose of oiled sand used in blasting.

17. SOLIDIFIERS

Objective: To change the physical state of spilled oil from a liquid to a solid.

Description: Chemical agents (polymers) are applied to oil at rates of 10-45 percent or more, solidifying the oil in minutes to hours. Various broadcast systems, such as a leaf blowers, water cannons, or fire suppression systems, can be modified to apply the product over large areas. Can be applied to both

floating and stranded oil. Can be placed in booms, pillows, sausages, etc. and used like sorbents, although this type of solidifier application has not been used operationally.

Applicable Habitat Types: All water environments, bedrock, sediments, and artificial structures.

When to Use: When immobilization of the oil is desired, to prevent refloating from a shoreline, penetration into the substrate, or further spreading. However, the oil may not fully solidify unless the product is well mixed with the oil, and may result in a mix of solid and untreated oil. Generally not used on heavy oil spills, which are already viscous.

Biological Constraints: Must be able to recover all treated material.

Environmental Effects: Available products are insoluble and have very low aquatic toxicity. Unrecovered solidified oil may have longer impact because of slow weathering rates. Physical disturbance of habitat is likely during application and recovery.

Waste Generation: If skimming efficiency is increased, solidifiers may reduce the volume of water collected during oil recovery. Effects on recycling oil treated with solidifiers is unknown. Most solidifier producers state that treated oil can pass leachate tests, allowing disposal in landfills.

18. SHORELINE CLEANING AGENTS (SURFACE WASHING AGENTS)

Objective: To increase the efficiency of oil removal from contaminated substrates.

Description: Special formulations are applied to the substrate, as a presoak and/or flushing solution, to soften or lift weathered or heavy oils from the substrate to enhance flushing methods. The intent is to lower the water temperature and pressure required to mobilize the oil from the substrate during flushing. Some agents will disperse the oil as its washed off the beach, others will not.

Applicable Habitat Types: On any habitat where water flooding and flushing procedures are applicable.

When to Use: When the oil has weathered to the point where it cannot be removed using ambient water temperatures and low pressures. This approach may be most applicable where flushing effectiveness decreases as the oil weathers.

Biological Constraints: When the product does not disperse the oil into the water column, the released oil must be recovered from the water surface. Use may be restricted where suspended sediment concentrations are high, near wetlands, and near sensitive near shore resources.

Environmental Effects: The toxicity and effects on dispersability of treated oil vary widely among products. Selection of a product should consider the toxicity of the product.

Waste Generation: Because treated oil must be recovered, waste generation is a function of recovery method, which often includes sorbents.

19. NUTRIENT ENRICHMENT (BIOSTIMULATION)

Objective: To accelerate the rate of oil hydrocarbon degradation due to natural microbial processes using a form of bioremediation that adds nutrients (generally nitrogen and phosphorus) that stimulate microbial

growth. If nutrients are a limiting factor (as measured using the interstitial pore water) in an area where shoreline oiling has occurred, water-soluble nutrients can be applied by a spray irrigation system.

Description: Nutrients should be applied daily if the impacted area gets completely submerged by tides and waves and if maximum biostimulation is desired. If the impacted area gets submerged only during spring tides, the frequency of nutrient addition will be determined by the intertidal zone water coverage. Using slow-release granular or encapsulated nutrients or oleophilic fertilizer (which adheres to the oil residue on the surface) should require less frequent addition, but time-series monitoring of interstitial pore water nutrient levels is needed to ensure target levels are being maintained, especially throughout the depth of the impacted intertidal zone.

When to Use: Any shoreline habitat type where access is allowed and nutrients are deficient.

Applicable Habitat Types: On moderate to heavily oiled substrates, after other techniques have been used to remove free product on lightly-oiled shorelines, where other techniques are destructive or ineffective; and where nutrients limit natural attenuation. Most effective on light to medium crude oils and fuel oils (asphaltenes tend to inhibit rapid biodegradation). Less effective where oil residues are thick. Not considered for gasoline spills, which evaporate rapidly.

Biological Constraints: Avoid using ammonia-based fertilizers at highly elevated concentrations because un-ionized ammonia is toxic to aquatic life. Nitrate is an equally good nitrogen source, minus the toxicity. Sodium tripolyphosphate is a better phosphorus source than orthophosphates because it is more soluble in seawater. If nutrients are applied properly with adequate monitoring, eutrophication should not be a problem. Only nutrient additives proven to be nontoxic and effective in either the laboratory or the field should be used in the environment. Contact toxicity of oleophilic nutrients may restrict their use as other chemicals in the product could be more toxic to aquatic organisms in the presence of oil.

Environmental Effects: Detrimental effects to shoreline from foot or vehicle traffic caused by workers applying nutrients (unless nutrients are sprayed from a vessel or aircraft).

Waste Generation: None.

20. NATURAL MICROBE SEEDING (BIOAUGMENTATION)

Objective: To accelerate natural microbial degradation of oil by using a form of bioremediation that adds high numbers of oil-degrading microorganisms.

Description: Formulations containing specific hydrocarbon-degrading microbes are added to the oiled area because indigenous hydrocarbon degraders are low in number, or, those that are present cannot degrade the oil effectively. Since microbes require nitrogen and phosphorus to convert hydrocarbons to biomass, formulations containing these oil degraders must also contain adequate nutrients. Research studies conducted with bioengineered organisms or organisms enriched from different environments, grown in the laboratory to high numbers, and applied to an oiled beach to stimulate rapid biodegradation, have failed to prove conclusively that seeding is effective.

Bioaugmentation appears less effective than biostimulation because: 1) hydrocarbon degraders are ubiquitous in nature and, when an oil spill occurs at a given site, the influx of oil will cause an immediate increased response in the hydrocarbon degrading populations; but, 2) if nutrients are in limited supply, the rate of oil biodegradation will be less than optimal; thus, 3) supplying nutrients will enhance the process

initiated by the spill, but adding microorganisms will not, because they still lack the necessary nitrogen and phosphorus to support growth.

Applicable Habitat Types: There is insufficient information on impact or effectiveness of this method to make a judgment on applicable habitat.

When to Use: There is insufficient information on impact or effectiveness of this method to make a judgment on when to use it.

Biological Constraints: Avoid using products containing ammonia-based fertilizers at elevated concentrations because un-ionized ammonia is toxic to aquatic life. Nitrate is an equally good a nitrogen source, minus the toxicity. If the product containing nutrients is applied properly with adequate monitoring, eutrophication should not be a problem; but, toxicity tests should be evaluated carefully, as other chemicals in the product could be toxic to aquatic organisms.

Environmental Effects: Detrimental physical effects to shoreline from foot or vehicle traffic caused by workers applying bioaugmentation products (unless nutrients are sprayed from a vessel or aircraft).

Waste Generation: None.

21. IN-SITU BURNING

Objective: To remove oil from the water surface or habitat by burning it in place.

Description: Oil floating on the water surface is collected into slicks at least 2-3 mm thick and ignited. The oil can be contained in fire-resistant booms, or by natural barriers such as ice or the shore. On land, oil can be burned when it is on a combustible substrate such as vegetation, logs, and other debris. Oil can be burned from non-flammable substrates using a burn promoter. On sedimentary substrates, it may be necessary to dig trenches for oil to accumulate in pools to a thickness that will sustain burning. Heavy oils are hard to ignite but can sustain a burn. Emulsified oils may not ignite nor sustain a burn when the water content is greater than 30 to 50 percent.

When to Use: On most habitats except dry muddy substrates where heat may impact the biological productivity of the habitat. May increase oil penetration into permeable substrates. Use in marshes should be undertaken using special precautions. Not suitable for woody vegetation such as mangroves and hardwood swamps.

Applicable Habitat Types: On land, where there is heavy oil in sites neither amenable nor accessible to physical removal and it is important to remove the stranded oil quickly. In wetlands and mud habitats, a water layer will minimize impacts to sediments and roots. Many potential applications for spills in ice. There are many operational and public health limitations.

Biological Constraints: The possible effect of smoke on wildlife and populated areas should be evaluated.

Environmental Effects: Temperature and air quality effects are likely to be localized and short-lived. Toxicological impact from burn residues has not been evaluated. On-water, burn residues are likely to sink. On land, removal of residues is often necessary for crude and heavy oils. Limited data on burning

oiled wetlands indicate recovery of wetland vegetation will depend on season of burn, type of vegetation, and water level in the marsh at time of burn.

Waste Generation: Any residues remaining after burning will need to be collected and landfilled, but with an efficient burn will be a small fraction of the original oil volume.

COASTAL INLETS

The coastal inlets of California are the focal points for designing strategies to protect the vital resources of the State's estuaries and bays. It is through these inlets that oil spilled on open ocean waters could reach inland resources. A publication titled Coastal Inlet Protection Strategies for Oil-Spill Response was prepared jointly by Miles O. Hayes and Todd M. Montello. This document provides a synopsis of the relevant characteristics of the coastal inlets in the State, as well as a discussion of potential protection strategies for each inlet. The discussion of each inlet alludes to the range of conditions that might occur at the inlet; however, the proposed protection strategies are based on the best professional judgement of what would work under average wave and tide conditions.

Table 44. GASOLINE PRODUCTS (Category I): Relative environmental impact from response methods for SHORELINE INTERTIDAL habitats. This table should not be used without the accompanying text in the document.

Response Method	*Exposed Rocky Shores (1a)*	*Exposed Solid Man-made Structures (1b)*	*Exposed Wave-cut Platforms (2a)*	*Sand Beaches (3) & (4)*	*Mixed Sand and Gravel Beaches (5)*	*Gravel Beaches (6a)*	*Riprap (6b)*	*Exposed Tidal Flats (7)*	*Sheltered Rocky Shores (8a)*	*Sheltered Solid Man-made Structures (8b)*	*Sheltered Tidal Flats (9a)*	*Salt to Brackish Marshes (10a)*
Natural Recovery	A	A	A	A	A	A	A	A	A	A	A	A
Barriers/Berms	–	–	–	B	C	–	–	B	–	–	B	B
Manual Oil Removal/Cleaning	–	–	–	D	D	D	–	–	–	–	–	D
Mechanical Oil Removal	–	–	–	D	D	D	–	–	–	–	–	D
Sorbents	–	–	–	–	–	–	–	–	A	–	–	–
Vacuum	–	–	–	–	–	–	–	–	–	–	–	–
Debris Removal	–	–	–	–	–	–	–	–	–	–	–	–
Sediment Reworking/Tilling	–	–	–	D	D	D	–	–	–	–	–	D
Vegetation Cutting/Removal	–	–	–	–	–	–	–	–	–	–	–	D
Flooding (deluge)	–	–	–	A	A	A	A	–	–	–	–	B
Low-pressure, Ambient Water Flushing			–	B	B	A	A	–	–	–	–	B
High-pressure, Ambient Water Flushing			–	–	–	–	A	–	–	–	–	–
Low-pressure, Hot Water Flushing			–	–	–	–	–	–	–	–	–	–
High-pressure, Hot Water Flushing			–	–	–	–	–	–	–	–	–	–
Steam Cleaning	–	–	–	–	–	–	–	–	–	–	–	–
Sand Blasting	–	–	–	–	–	–	–	–	–	–	–	–
Solidifiers	–	–	–	–	–	–	–	–	–	–	–	–
Shoreline Cleaning Agents	–	–	–	–	–	–	–	–	–	–	–	–
Nutrient Enrichment	–	–	–	–	–	–	–	–	–	–	–	–
Natural Microbe Seeding	–	–	–	–	–	–	–	–	–	–	–	–
***In-situ* Burning**	–	–	–	–	–	–	–	–	–	–	–	–

The following categories are used to compare the relative environmental impact of each response method for the specific environment or habitat for each oil type:

A = May cause the least adverse habitat impact.
B = May cause some adverse habitat impact.
C = May cause significant adverse habitat impact.
D = May cause the most adverse habitat impact.
I = Insufficient Information - impact or effectiveness of the method could not be evaluated.
— = Not applicable.

Table 45. DIESEL-LIKE PRODUCTS AND LIGHT CRUDE OILS (Category II): Relative environmental impact from response methods for SHORELINE INTERTIDAL habitats.
This table should not be used used without the accompanying text in the document.

Response Method	*Exposed Rocky Shores (1a)*	*Exposed Solid Man-made Structures (1b)*	*Exposed Wave-cut Platforms (2a)*	*Sand Beaches (3) & (4)*	*Mixed Sand and Gravel Beaches (5)*	*Gravel Beaches (6a)*	*Riprap (6b)*	*Exposed Tidal Flats (7)*	*Sheltered Rocky Shores (8a)*	*Sheltered Solid Man-made Structures (8b)*	*Sheltered Tidal Flats (9a)*	*Salt to Brackish Marshes (10a)*
Natural Recovery	A	A	A	B	B	A	A	A	A	A	A	A
Barriers/Berms	–	–	–	B	C	B	–	B	–	–	B	B
Manual Oil Removal/Cleaning	–	–	B	B	C	C	A	C	C	B	D	D
Mechanical Oil Removal	–	–	–	B	C	D	–	D	–	–	–	D
Sorbents	B	B	B	B	A	A	A	A	A	A	A	A
Vacuum	A	–	A	–	–	–	–	C	B	–	C	B
Debris Removal	A	–	A	A	A	A	A	B	A	A	B	B
Sediment Reworking/Tilling	–	–	–	B	B	B	–	–	–	–	–	D
Vegetation Cutting/Removal	–	–	–	C	C	–	–	D	–	–	–	D
Flooding (deluge)	–	–	A	A	A	A	A	A	A	–	B	B
Low-pressure, Ambient Water Flushing			A	B	A	A	A	B	A	A	C	B
High-pressure, Ambient Water Flushing			B	–	–	–	A	–	C	B	–	–
Low-pressure, Hot Water Flushing			D	–	–	–	C	–	–	–	–	–
High-pressure, Hot Water Flushing			D	–	–	–	C	–	–	–	–	–
Steam Cleaning	–	–	–	–	–	–	–	–	–	–	–	–
Sand Blasting	–	–	–	–	–	–	–	–	–	–	–	–
Solidifiers	–	–	C	–	–	–	B	C	C	–	C	C
Shoreline Cleaning Agents	–	–	–	–	–	–	–	–	–	–	–	–
Nutrient Enrichment	–	–	–	A	A	A	A	I	A	I	I	A
Natural Microbe Seeding	–	–	I	I	I	I	I	I	I	I	I	I
***In-situ* Burning**	–	–	D	–	–	–	–	–	D	–	–	B

The following categories are used to compare the relative environmental impact of each response method for the specific environment or habitat for each oil type:

A = May cause the least adverse habitat impact.
B = May cause some adverse habitat impact.
C = May cause significant adverse habitat impact.
D = May cause the most adverse habitat impact.
I = Insufficient information - impact or effectiveness of the method could not be evaluated.
— = Not applicable.

Table 46. MEDIUM GRADE CRUDE OILS AND INTERMEDIATE PRODUCTS (Category III): Relative environmental impact from response methods for SHORELINE INTERTIDAL habitats.
This table should not be used without the accompanying text in the document.

Response Method	*Exposed Rocky Shores (1a)*	*Exposed Solid Man-made Structures (1b)*	*Exposed Wave-cut Platforms (2a)*	*Sand Beaches (3) & (4)*	*Mixed Sand and Gravel Beaches (5)*	*Gravel Beaches (6a)*	*Riprap (6b)*	*Exposed Tidal Flats (7)*	*Sheltered Rocky Shores (8a)*	*Sheltered Solid Man-made Structures (8b)*	*Sheltered Tidal Flats (9a)*	*Salt to Brackish Marshes (10a)*
Natural Recovery	A	A	A	B	B	B	B	A	B	B	B	B
Barriers/Berms	–	–	–	B	C	B	–	B	–	–	B	B
Manual Oil Removal/Cleaning	B	B	B	A	B	B	A	B	B	B	C	C
Mechanical Oil Removal	–	–	–	B	B	C	B	D	–	–	–	D
Sorbents	A	A	A	A	A	A	A	A	B	A	A	A
Vacuum	A	–	A	B	B	B	A	B	B	–	B	B
Debris Removal	A	–	A	A	A	A	A	B	A	A	B	B
Sediment Reworking/Tilling	–	–	–	B	B	B	–	C	–	–	–	D
Vegetation Cutting/Removal	–	–	–	C	C	–	–	D	D	–	D	C
Flooding (deluge)	–	–	A	A	B	B	B	A	A	–	B	B
Low-pressure, Ambient Water Flushing			A	B	A	A	B	B	A	B	C	B
High-pressure, Ambient Water Flushing			B	–	C	B	B	–	B	B	–	–
Low-pressure, Hot Water Flushing			C	C	C	C	C	–	D	C	–	–
High-pressure, Hot Water Flushing			C	–	D	C	C	–	D	C	–	–
Steam Cleaning	D	D	D	–	D	D	D	–	D	D	–	–
Sand Blasting	D	D	D	–	–	–	D	–	D	D	–	–
Solidifiers	–	–	C	B	B	B	B	C	C	–	C	C
Shoreline Cleaning Agents	C	B	C	C	C	B	B	–	B	B	–	B
Nutrient Enrichment	–	–	–	A	A	A	A	I	B	I	I	B
Natural Microbe Seeding	–	–	I	I	I	I	I	I	I	I	I	I
***In-situ* Burning**	–	–	D	C	C	C	D	–	C	–	–	B

The following categories are used to compare the relative environmental impact of each response method for the specific environment or habitat for each oil type:

A = May cause the least adverse habitat impact.
B = May cause some adverse habitat impact.
C = May cause significant adverse habitat impact.
D = May cause the most adverse habitat impact.
I = Insufficient Information - impact or effectiveness of the method could not be evaluated.
— = Not applicable.

Table 47. HEAVY CRUDE OILS AND RESIDUAL PRODUCTS (Category IV): Relative environmental impact from response methods for SHORELINE INTERTIDAL habitats.
This table should not be used without the accompanying text in the document.

Response Method	*Exposed Rocky Shores (1a)*	*Exposed Solid Man-made Structures (1b)*	*Exposed Wave-cut Platforms (2a)*	*Sand Beaches (3) & (4)*	*Mixed Sand and Gravel Beaches (5)*	*Gravel Beaches (6a)*	*Riprap (6b)*	*Exposed Tidal Flats (7)*	*Sheltered Rocky Shores (8a)*	*Sheltered Solid Man-made Structures (8b)*	*Sheltered Tidal Flats (9a)*	*Salt to Brackish Marshes (10a)*
Natural Recovery	A	A	A	C	C	B	B	A	B	B	B	B
Barriers/Berms	–	–	–	B	B	B	–	B	–	–	B	B
Manual Oil Removal/Cleaning			B	A	A	B	A	B	C	B	C	C
Mechanical Oil Removal	–	–	–	B	B	C	C	D	–	–	–	D
Sorbents	A	A	A	A	B	B	B	B	C	B	B	A
Vacuum	A	–	A	A	B	B	A	B	B	–	B	B
Debris Removal	A	–	A	A	A	A	A	B	A	A	B	B
Sediment Reworking/Tilling			–	B	B	B	–	C	–	–	–	D
Vegetation Cutting/Removal			–	C	C	–	–	D	D	–	D	C
Flooding (deluge)	–	–	B	B	C	C	C	A	B	–	B	B
Low-pressure, Ambient Water Flushing			B	B	B	B	C	C	B	C	D	B
High-pressure Ambient Water Flushing			B	–	D	B	B	–	B	C	–	–
Low-pressure, Hot Water Flushing			C	C	C	B	C	–	D	C	–	–
High-pressure Hot Water Flushing			C	–	D	C	C	–	D	C	–	–
Steam Cleaning	D	D	D	–	D	D	D	–	D	D	–	–
Sand Blasting	D	D	D	–	–	–	D	–	D	D	–	–
Solidifiers	–	–	–	–	–	–	–	–	–	–	–	–
Shoreline Cleaning Agents			C	C	C	B	B	–	B	B	–	B
Nutrient Enrichment	–	–	–	B	B	B	B	I	C	I	I	B
Natural Microbe Seeding	–	–	I	I	I	I	I	I	I	I	I	I
***In-situ* Burning**	–	–	D	C	C	C	D	–	C	–	–	B

The following categories are used to compare the relative environmental impact of each response method for the specific environment or habitat for each oil type:

A = May cause the least adverse habitat impact.
B = May cause some adverse habitat impact.
C = May cause significant adverse habitat impact.
D = May cause the most adverse habitat impact.
I = Insufficient Information - impact or effectiveness of the method could not be evaluated.
— = Not applicable.

Table 48. NON-FLOATING OIL PRODUCTS (Category V): Relative environmental impact from response methods for SHORELINE INTERTIDAL habitats. This table should not be used without the accompanying text in the document.

Response Method	*Exposed Rocky Shores (1a)*	*Exposed Solid Man-made Structures (1b)*	*Exposed Wave-cut Platforms (2a)*	*Sand Beaches (3) & (4)*	*Mixed Sand and Gravel Beaches (5)*	*Gravel Beaches (6a)*	*Riprap (6b)*	*Exposed Tidal Flats (7)*	*Sheltered Rocky Shores (8a)*	*Sheltered Solid Man-made Structures (8b)*	*Sheltered Tidal Flats (9a)*	*Salt to Brackish Marshes (10a)*
Natural Recovery	A	A	A	D	C	B	B	A	B	B	B	B
Barriers/Berms	–	–	–	B	B	B	–	B	–	–	B	B
Manual Oil Removal/Cleaning	B	B	B	A	A	A	A	B	C	B	C	C
Mechanical Oil Removal	–	–	–	B	B	C	C	D	–	–	–	D
Sorbents	A	A	A	B	B	B	B	B	C	B	B	B
Vacuum	A	–	A	A	B	B	A	B	C	–	B	B
Debris Removal	A	–	A	A	A	A	A	B	A	A	B	B
Sediment Reworking/Tilling	–	–	–	B	B	B	–	C	–	–	–	D
Vegetation Cutting/Removal	–	–	–	C	C	–	–	D	D	–	D	C
Flooding (deluge)	–	–	B	C	C	C	C	B	C	–	C	B
Low-pressure, Ambient Water Flushing			B	C	C	C	C	C	C	C	D	B
High-pressure, Ambient Water Flushing			B	–	D	B	C	–	C	C	–	–
Low-pressure, Hot Water Flushing			C	C	C	B	C	–	D	C	–	–
High-pressure, Hot Water Flushing			C	–	D	C	C	–	D	C	–	–
Steam Cleaning	D	D	D	–	D	D	D	–	D	D	–	–
Sand Blasting	D	D	D	–	–	–	D	–	D	D	–	–
Solidifiers	–	–	–	–	–	–	–	–	–	–	–	–
Shoreline Cleaning Agents	C	B	C	C	C	B	B	–	B	B	–	I
Nutrient Enrichment	–	–	–	C	C	B	B	I	C	I	I	B
Natural Microbe Seeding	–	–	I	I	I	I	I	I	I	I	I	I
***In-situ* Burning**	–	–	–	C	C	C	–	–	C	–	–	C

The following categories are used to compare the relative environmental impact of each response method for the specific environment or habitat for each oil type:

A = May cause the least adverse habitat impact.
B = May cause some adverse habitat impact.
C = May cause significant adverse habitat impact.
D = May cause the most adverse habitat impact.
I = Insufficient Information - impact or effectiveness of the method could not be evaluated.
— = Not applicable.

4530.8 **Near Spill Containment and Recovery:**

The most effective strategy to aid oil collection and removal is containment. All oil removal and recovery techniques are most effective where oil is thickest. Typically, this is at or near the release site. The most effective use of resources is to insure containment at the primary release site. This must include surrounding the release site with impervious oil barriers including multiple layers of boom as necessary. As oil escapes containment it becomes increasingly difficult to recover and recovery success diminishes rapidly.

Inevitable oil escapes containment, and additional measures must be included to deal with oil escaping containment. This is particularly a necessary where oil booming is subject to winds and waves or strong currents (which includes most sites along the open coast and in San Francisco and Humboldt Bays): oil entrains or is splashed over boom. To counter oil escapement, deployments should include preplanning to anticipate and control escapement. Two measures must be incorporated.

First, configure containment booms to focus and limit any oil escapement to preplanned points along the boom perimeter, for both the ebb and flood tides; these points should be selected to optimize recovery of any escaping oil. A skimmer should then be positioned just downstream from these locations where it can continue skimming escaping oil throughout the 24 hour tide cycle regardless of light or weather conditions. This is very practical in bay conditions where both boom and skimmers can be positioned by anchoring. In open ocean conditions it is more difficult to implement.

Second, employ secondary booming in the spill area. This strategy is most effective in the near shore areas typical in bays, though opportunities may occur in open water to slow spread from the primary containment area. In bays, spill locations are often near shorelines. Shorelines act as containment since they prevent free movement of oil. Also, winds and tides often drive oil toward the shore. Once oil is ashore or in a low current area, contain and recover it there, if possible, to minimize its movement and contamination of other locales. Wherever possible every attempt should be made to contain and collect oil along shorelines that are already oiled. Shores, which have already been impacted, can no longer be protected; therefore, use them as containment and recovery sites. The objective then changes from protection to containment and preventing oil escape to unoiled areas.

If the oil moves from a near shore spill site to open water, the recovery potential will diminish dramatically. As with primary containment, escapement secondary containment booms is predictable and skimmers should be positioned to capture oil throughout the day and night, particularly during the ebb tide. These secondary shoreline confinement strategies should always be reviewed with the Resources at Risk Specialist.

Shoreline Collection: There are predictable locales where recovery efforts can be optimized at shorelines. Since oil re-accumulates, there are two situations where oil collection should be vigorously attempted at the shoreline: 1. Places where oil naturally collects at the shoreline because of winds and currents and 2. Diversion and capture of oil as it flows past or along shorelines and points with low environmental sensitivities.

(The reason oil recollects, is that oil is a substance that spreads primarily in two dimensions on the water surface while water moves in three dimensions; oil will spread and thin but, it will also re-accumulates at predictable locales. It will accumulate wherever water has downward currents, such as tide rips along mud flats, and at windward coves.)

Natural collection points for debris are on all shorelines. These points are so predictable that it is very difficult to keep oil off even with pre-deployments. An alternative is to anticipate such collections and leverage the opportunity for oil capture. This entails developing the site for collection while limiting and focusing undesirable impacts to the habitat. Though this entails risk, the trade-off is likely to be nominal since the impacts are virtually inevitable.

Diversions to shores with low environmental sensitivities are a desirable alternative to unmitigated spread. As described above, oil spreads rapidly on open water and effectual on-water skimming is difficult in a high current environment. Diversion can shunt oil out of the high current and into quiet water capture points at shore. It can be an effective addition to on-water skimming recovery.

Here are the operational considerations when establishing a shoreline collection site when oil is moving along or near shore. Boom sound is positioned at an acute angle to the current to move oil toward the shore collection. Cascading boom arrangements may be necessary. Once oil is at the shoreline, it may be necessary to deploy additional boom to trap the accumulated oil at the shore collection site when the tide reverses. Good land accessibility is important part of selecting capture sites since it permits site support and easy removal of collected oil. Though some natural collection sites may have poor land access, they may be important accumulation points that can be exploited effectively via water.

Deployments of this type should be made only per recommendation of the ACP, Incident Action Plan or with the direction of the Resources at Risk Specialist and the Unified Command.

4540 Waste Management Strategies

One of the major problems associated with an oil spill response is the disposal of collected product and contaminated cleanup materials, soil, and debris. Each category of waste has it own type of response and management problem. The following discussion presents a general approach to the management of the various types of wastes collected during an oil spill. The flow chart following this section presents an encapsulated view of what types of waste are generated by an oil spill and the disposal options for each type.

Disposal Options

Crude oil and refined Petroleum Products. Under California law, material released or discharged to marine waters of the state are defined as waste. Once the final disposition of a specific waste is determined, the waste may be redefined as a product or material and may no longer be subject to waste management requirements.

Crude oil spilled into marine waters, recovered, and transported to a refinery may be considered a product and may not be subject to hazardous waste management regulations [California Health and Safety Code (CHSC), 25943.2]. The collected crude oil may be shipped to the refinery of original destination or a refinery that can accept the spilled crude oil. Refined petroleum products that are recovered from marine waters may also be handled as a product if they can be used for their originally intended purpose (i.e. fuel, fuel oil, etc.)(CHSC 25250.3).

There are other avenues by which recovered petroleum may be managed as a material (CHSC 25143.2). These approaches include recycling the petroleum through incineration, as a fuel, a substitute for raw

material feedstock, or as an ingredient used in the production of a product (i.e. asphalt). The California Environmental Protection Agency, Department of Toxic Substances Control (DTSC) should be consulted for more information on these and other management options.

State law requires the consideration of recycling, therefore recycling should be a top priority and will be undertaken if at all possible. The latest published list of companies who recycle oil, and the latest published list of licensed used oil haulers are presented in tables following this subsection. A discussion of waste minimization and recycling options is included in this subsection.

Recovered petroleum "products" that are not accepted by a refinery or that can not be recycled must be managed as a waste. In order that the appropriate management mechanism is determined for the recovered petroleum, the waste must be characterized by a state certified laboratory to determine if the waste is hazardous or non-hazardous. It is the responsibility of the Responsible Party (RP) to have the waste accurately characterized for proper disposition [Title 22, Sec. 66260.200(C) of the California Code of Regulations (22 CCR)].

Disposal at Sea of Water Separated from Recovered Oil. Oil recovered at sea typically contains significant amounts of seawater. In order to maintain the efficiency of the skimming process this water must be separated/decanted from the oil and discharged back to the ocean during recovery operations. Separated seawater typically contains elevated levels of hydrocarbons and thus the discharge of this material may constitute a discharge of a pollutant. This issue is presently being discussed with regulatory agencies to determine if a National Pollution Discharge Elimination System (NPDES) permit, or a waiver from the permit, is required before separated/decanted water may be discharged back into state waters. The USCG On-Scene Commander recognizes the "discharge" of separated/decanted water as an integral part of offshore skimming operations and as an excellent waste minimization tool. Therefore, the USCG OSC or his/her representative may authorize the discharge of separated/ decanted water back into the catenary area of a boom/skimming system outside of State waters (3 miles). The exception to this will be in NOAA Marine Sanctuary waters.

With the addition of the Monterey Bay National Marine Sanctuary a significant portion of the coastline is now part of the National Marine Sanctuary program. Other sanctuaries include Point Reyes/Farallon Island, Channel Islands San Miguel, Santa Cruz, Santa Rosa, Anacapa, Santa Barbara Island, Richardson and Castle Rock), and Cordel Banks. Federal law prohibits the discharge of material, such as separated water, to marine sanctuaries unless permitted by the Administrator of the sanctuary program. Negotiations are presently under way seeking pre-approval to discharge separated waters during an emergency response to oil spills within the sanctuaries. Until pre-approval is obtained, a permit for the discharge of separated water must be obtained from the Assistant Administrator of the Sanctuary Program (202-606-4122) before any discharge can take place.

Contaminated Debris. Contaminated debris, including organic material, contaminated cleanup equipment (i.e. booms, pompoms, sorbents, etc.) and other contaminated materials that cannot be recycled must be managed as a waste. The materials must also be characterized before the appropriate waste management option is determined.

Oiled Animal Carcasses. Oiled animals and carcasses should be collected and turned over to the California Department of Fish and Game, Office of Oil Spill Prevention and Response (OSPR) representatives who are responsible for wildlife rehabilitation and collection of carcasses for natural resource damage assessment (NRDA) investigations. The identification and location of OSPR

representatives can be provided by the Unified Command Center. OSPR will be responsible for the disposal of the oil-contaminated carcasses.

Waste Minimization and Recycling Opportunities

Debris Avoidance. It is generally not possible to avoid the generation of oily debris resulting from the contact of floating oil with waterborne solids, however, it is possible to minimize the generation of oily debris in the coastal intertidal zone if the anticipated area of oil impact can be cleaned prior to stranding of the spilled oil. This has been successfully accomplished in a small number of past spills (W. Schumaker, personal communication).

Personnel can be deployed to remove debris from beach intertidal areas above the high tide line in order to minimize oiling of stranded debris/trash. It is important to note that such crews are not likely to be certified as required under OSHA 1910.120 and can only perform this task prior to the stranding of spilled oil. A safety/industrial hygiene specialist (see 9334) should be consulted regarding the limitations of these crews and the effective establishment of exclusion zones in the area of beach impact.

Selection of Personal Protective Equipment. Depending upon climatic conditions and material compatibilities of personal protective equipment (PPE), waste can be minimized through the selection of reusable equipment, when possible. For instance, heavy gloves and boots that can be effectively decontaminated and reused can minimize the generation of oil-contaminated disposable gloves and boots, as long as the site safety officer approves such equipment use. Reusable rain gear may also be used instead of disposable suits, if approved. Such decisions should be made early in the response process in order to minimize generating containerized, contaminated PPE which is generally disposed at Class I facilities.

Recovered Oil and Oily-water. In order to maximize skimmer efficiency and effectiveness, water should be decanted to the spill impact area with the approval of the federal OSC and relevant state agency representatives. Operational standards (e.g., decanting only in the impact area where water depth is sufficient, no free oil) should be established as soon as skimming is initiated. In federal waters, decanting can be approved through a request to the federal OSC. As discussed earlier, in state waters approval must be secured from the Regional Water Quality Control Board.

Both oil and oily-water recovered from skimming operations should be off loaded to facilities where it can be effectively recycled/managed within established process and treatment streams. Such facilities would include terminals, refineries and commercial refiners/reclaimers/recyclers. These facilities can often provide temporary tank storage, when necessary. Oiled debris that is recovered with skimmed oil should be maintained in secure, temporary storage until it is sufficiently characterized for disposal.

Sorbent Use/Reuse. Synthetic sorbents (i.e., pads, sweeps, and booms) have become standard response materials in the “mechanical recovery” of spilled oil. Their oleophilic, hydrophobic character makes them efficient at separating oil and water and they are routinely used to recover oil from solid surfaces as well (e.g., rubble, cobble and boulder shorelines; equipment/gear; vessels; etc.). Since oiled sorbent material often constitutes a substantial percentage of the oily solid waste generated during spill response and cleanup, opportunities for minimizing this waste volume should be considered.

Some sorbents are designed to be reusable (i.e., mechanized rope-mop skimmers) or can be recycled onsite with inexpensive gear (e.g., appropriate barrel-mounted wringers). Sorbent manufacturer's instructions should be followed regarding the limits of effective reuse for their individual products. It is

also possible to replace sorbent sweeps and booms with recyclable boom and other appropriate gear in circumstances where floating oil can be efficiently recovered without generating oiled sorbents. For example, in good-access, low energy shoreline areas (harbors, bays, inlets), it may be possible to use containment-boom and recover the trapped oil with vacuum trucks instead of contaminating large volumes of sorbent.

Petroleum-contaminated Spill Recycling and Reuse. While the volume of petroleum-contaminated soil associated with coastal spills is generally lower than such volumes resulting from large inland spills, opportunities for recycling/reuse should be considered. For soils satisfying the waste profiling requirements of the state and commercial facilities, beneficial reuse as daily landfill cover after appropriate treatment is an available option in California (see Response Resources lists). Recycling of oil-contaminated soil as aggregate in cold-mix and hot batch asphalt is available at four facilities in the State of Washington (Nash, et. al, 1992).

Furthermore, a recently completed study of the incorporation of oily/solid residuals into construction materials concluded that a large market exists in California and that these recycling/reuse opportunities should be pursued and encouraged (Mittelhauser Corporation, 1992). It is important to note that both the costs and benefits of such recycling (less than $100/ton and low future liability) versus disposal in a California Class I or II disposal facility (greater than $100/ton and moderate to high future liability) are substantial. Removal of contaminated soil from temporary storage will require the authorization of the On-Scene Coordinator.

Temporary Storage

To expedite removal of spilled oil, refined products, and contaminated material from marine waters during an emergency response, temporary storage sites may be erected at appropriate shore locations [22 CCR 66270.1(c)3]. The transportation of oil and contaminated material to temporary storage sites during the emergency response is exempt from handling and permitting requirements [22 CCR 66263.30 and/or 66263.43]. The on-site California Environmental Protection Agency, Department of Toxic Substance Control (DTSC) representative or duty officer [(916) 445-3846] should be contacted for approval. If a Unified Command is established, OSPR will facilitate the contact with DTSC through their liaison function.

Temporary storage sites should be available at an onshore location convenient to the recovery operations to temporarily store recovered petroleum products and contaminated materials and debris. A temporary storage site may require a permit from the California Coastal Commission (CCC). For information on temporary permits within the coastal zone, contact the Energy and Resources unit of the CCC at (415) 904-5200.

Siting of the temporary facility must be done with the concurrence of the USCG and state OSC, DTSC, the local Regional Water Quality Control Board (RWQCB), and the local health, fire and emergency services departments. If a Unified Command is established, OSPR will facilitate the contact of the state and local government agencies through their liaison function.

Temporary storage facilities can include Baker tanks, tank trucks, oil drums, or empty fuel storage tanks. If suitable containers are not available, oily wastes may be temporarily stored in pits dug in the soil. These pits must be lined with plastic sheeting to prevent oil leakage and soil penetration.

Initial Treatment

Petroleum and petroleum contaminated cleanup materials can potentially be treated at a temporary storage site. One of the treatment processes that may be used is Transportable Treatment Units (TTU). The most likely treatment process undertaken with a TTU will be separation of seawater from collected petroleum. Another method employed for separating water is decanting water from temporary storage tanks.

Any water generated through the separation of petroleum and seawater may be potentially discharged to a sanitary sewer system or back to marine waters. The sanitary sewer discharge will require a permit from the local sanitation district that will establish effluent requirements for the discharged water. Should a sanitation district not allow the discharge of water to its system, the recovered sea water would either be discharged back to the adjacent marine waters or transported off-site for disposal. The discharge of recovered seawater to state waters will require a NPDES permit from the local RWQCB.

A portable incinerator may be another type of TTU available during a spill response for use with contaminated material. The use of an incinerator will require a permit from the local air quality agency. The potential use of any TTU and regulatory standards must be discussed with DTSC.

Characterization of Recovered Material

Recovered petroleum and contaminated debris not recycled must be characterized to determine their waste classification before the waste can be shipped to a proper waste management facility for final disposal. A State of California certified laboratory may conduct the actual testing on representative samples of each type of waste.

It is the responsibility of the generator/RP to have petroleum and contaminated material managed as waste accurately classified as hazardous or non-hazardous for proper disposition [22 CCR 66260.200(c)]. A generator who incorrectly determines and manages a hazardous waste as non-hazardous is in violation of the hazardous waste requirements and may be subject to DTSC enforcement action.

22 CCR 66264.13 and 66265.13 states that before an owner or operator of a treatment, storage, or disposal facility transfers, treats or disposes of any hazardous waste, the owner or operator shall obtain a detailed chemical and physical analysis of a representative sample of the waste. Characterization of the waste must be provided to DTSC (via profile sheet). The DTSC then designates the waste acceptable prior to shipment. State criteria for characterizing a waste hazardous or non-hazardous is found in 22 CCR 66261.10 and 66261.20-66261.24 while federal criteria is presented in 40 CFR 261.30-261.33. These criteria can apply to any oily-water; sorbents, booms, and debris generated as a result of oil spill cleanup. Based on waste characterization, the wastes can be further defined as either a Federal Resource Conservation and Recovery Act (RCRA) waste (hazardous waste regulated under federal regulations), non-RCRA waste (hazardous waste regulated under California regulations), or non-hazardous waste. Non-hazardous waste in this instance is defined as designated waste per 23 CCR 25522. Once the waste is characterized, disposition options can then be selected. Removal of recovered material from temporary storage will require the authorization of the OSC.

Transportation

Recovered petroleum product not accepted at a refinery or recycling facility and contaminated material must be transported to an approved waste management facility. The type of waste management facility will be based on the results of the waste characterization performed.

Hazardous Waste. Waste classified as hazardous under either federal or state regulations must be transported to a permitted or interim status hazardous waste facility. A state licensed hazardous materials hauler must do hauling of the waste. The licensed hauler must have an U.S. EPA I.D. number and State transporter I.D. number. Prior to removal of the hazardous material from temporary storage, a uniform hazardous waste manifest (form DHS-8022A) must be prepared by the generator (RP or his representative) for recovered petroleum and other contaminated materials (22 CCR 66263.20 - 66263.23). If assistance is required for manifesting, the RP may request it from the on-scene DTSC representative or the state DTSC duty officer (916-445-3846).

All hazardous materials shipped off-site must be transported in compliance with applicable regulations. These include the RCRA regulations in 40 CFR 262-263, DOT Hazardous Materials Regulations (49 CFR 171-178), and any applicable state regulations (22 CCR 6626.20-6626.23).

Non-hazardous Waste. Waste determined to be non-hazardous but designated waste (23 CCR 2522) will be transported to a Class II waste management facility. Manifesting of the waste is not required but a Bill of Lading is required for transportation. The appropriate Regional Water Quality Control Board and local health department should be contacted to determine what waste management facility would accept the waste and any additional test requirements the facility might require. Removal of non-hazardous waste from temporary storage will require authorization of the OSC.

4547 Waste Management Facilities

There are three licensed hazardous waste management facilities in California. They are:

a. *Kettleman Hills Chemical Waste Management Co., Kettleman City (Kern County), California.*

Contact customer service at (559) 386-9711. They will provide name and number of local agent to contact for disposal information.

Only class I facility that accepts liquid waste in any sizable quantity. Liquid petroleum accepted at Kettleman Hills will be transported to their subsidiary in Azusa, California and further transported out-of-state for incineration.

b. *Safety-Kleen, Westmorland (Imperial County), California.*

Contact customer service at (760) 344-9400 for information. This facility will accept only solid waste.

c. *Safety-Kleen, Buttonwillow (Kern County), California.*

Contact customer service at (661) 762-6200. This facility accepts only solid waste although it is developing the ability to process small volumes of liquid waste.

Literature Cited

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Mittelhauser Corporation. Strategy Report: Incorporation of Oily/Solid Residuals into Construction Materials. Western States Petroleum Association. 1992. 25.

Nash, J.H., et. al. Potential Reuse of Petroleum-Contaminated Soil: A Directory of Permitted Recycling Facilities. USEPA Risk Reduction Laboratory (ORD). 1992. 37.

Schumaker, W. Chief of Beach Safety & Sanitation, L.A. County. 1993.

WASTE EVALUATION - FEDERAL CRITERIA

Is the Material a Waste? (40 CFR 261.2)

A Solid Waste is an Abandoned, Recycled, or Inherently Waste-Like Discarded Material that is Not Specifically Excluded in 40 CFR 261.4.

Is the Waste Excluded from Regulation? (40 CFR 261.4)

Domestic Sewage Sludge	Ash Wastes from the Combustion of Fossil Fuels
Industrial Wastewater Subject to Regulations under the Clean Water Act	Spent Sulfuric Acid
Certain Chromium Wastes	Mining Overburden
Mining Wastes	
Wastes from Conditionally Household Waste	Exempt Small Quantity Generators

Is the Waste a Listed Hazardous Waste? (40 CFR 261.30-33)

Wastes from Non-Specific Sources (“F” List)

Wastes from Specific Sources (“K” List)

Discarded Commercial Chemical Products, Oil Specification Species, Container Residues & Spill Residues Thereof (“P” & “U” Lists)

Is the Waste a Characteristic Hazardous Waste? (CFR 261.20-24)

Ignitability

-Liquid (Other than Aqueous With <24% Alcohol) with Flashpoint <140_F

-Non-liquid Which Can Cause Fire and, When Ignited, Burns Persistently and Vigorously

-Flammable Compressed Gas [49 CFR 173.300(b)]

-Oxidizer (49 CFR 173.151)

Corrosivity

-Aqueous Liquid with pH <2 or >12.5

-Liquid that Corrodes Steel >6.35mm/yr at 55_F

Reactivity

-Normally Unstable - Generates Toxic Gases

-Reacts Violently - Contains Cyanides or Sulfides

-Explosive Mixtures - Detonates or Explodes

Toxicity

-40 Compounds have Assigned Regulatory Levels

-Samples are Compared to the Regulatory Threshold after being prepared Per the Toxicity Characteristic Leaching Procedure

W A S T E E V A L U A T I O N -
S T A T E C R I T E R I A

Is the Hazardous Waste mixed With a Non-hazardous Waste? (40 CFR 261.3)

A Mixture of a Listed Hazardous Waste and a Non-hazardous Waste is a Hazardous Waste Unless:

-The Listed Waste was listed merely because it exhibited a Characteristic and the Resultant Mixture No Longer exhibits that Characteristic

OR

-The Mixture is a Wastewater that is discharged Pursuant to Specific Provisions of the Clean Water Act

A Mixture of a Characteristic Hazardous Waste and a Non-hazardous Waste only if the Resultant Mixture Exhibits a Characteristic

Is the Waste a "Derived From" Waste? [40 CFR 261.3 (c)]

Any Solid Waste Generated From the Treatment, Storage, or Disposal of a Hazardous Waste Unless is a Hazardous Waste Unless the Waste is Specifically Excluded or Does Not Exhibit a Characteristic and is Not Derived From a Listed Waste.

Is the Material a Waste? (HSC 2412.4)

A Waste is Discarded Material that is Not Specifically Excluded. A Discarded Material is Relinquished, Recycled, or Inherently Waste-Like.

Is the Waste Listed in Appendix 10? (22 CCR, Division 4.5, Appendix X)

Wastes Listed in Appendix 10 Are Presumed Hazardous Unless Proven Otherwise by Applying Knowledge of or Testing the Characteristics of the Wastestream

Is the Waste a Characteristic Hazardous Waste? (22 CCR 66261.21-24)

Ignitability (22 CCR 66261.21)

-Identical Criteria to Federal Characteristics

Corrosivity (22 CCR 66261.22)

-Identical Criteria to Federal Characteristics Except That California Regulates Non-Aqueous Wastes In Addition to Aqueous Wastes

Reactivity (22 CCR 66261.23)

-Identical Criteria to Federal Characteristics

Toxicity (22 CCR 6626.24)

-Persistent and Bioaccumulative Substances

A Waste is Hazardous if the Soluble Concentration of a Substance is > its Regulatory Threshold Known as the Soluble Threshold Limit Concentration (STLC). The Soluble Concentration is Determined After Preparing the Samples with the Waste Extraction Test (WET)

A Waste is Hazardous if the Total Concentration of a Substance is > its Regulatory Threshold Known as the Total Threshold Limit Concentration.

Acute Toxicity

-Oral LD60 <5,000 mg/kg (single administration).

-Dermal LD60 <4,300 mg/kg (24 hour time period).

W A S T E E V A L U A T I O N -
S T A T E C R I T E R I A

Is the Waste a Characteristic Hazardous Waste? (22 CCR 66261.21-24) (continued)

-Inhalation LC50 <10,000 ppm as a gas or vapor (8 hour time period).

Aquatic Toxicity

-LC50 <500 mg/l

-96 Hour Bioassay

-Test species are either fathead minnows, golden shiners, or rainbow trout.

Chronic Toxicity

-16 Listed Carcinogens >0.001% (by weight)

A Waste Which Has Been Shown Through Experience or Testing to Pose a Hazard to Human Health or the Environment Because of its Carcinogenicity, Acute Toxicity, Bioaccumulative Properties or Persistence in the Environment

Is the Waste a Used Oil? (HSC 25250-25250.25)

Any Refined Crude Oil Which Has Become Contaminated With Physical or Chemical Impurities as a Result of Use

Any refined Crude Oil that is No Longer Useful to the Original Purchaser as a Consequence of Extended Storage, Spillage, or Contamination

Spent Lubricating Fluids

Spent Industrial Oils Contaminated Fuel With a Flashpoint > 100_F

Is the Waste an Extremely Hazardous Waste? (22 CCR 66261.110)

Acute Toxicity

-Acute Oral LD60<50 mg/kg

-Acute Dermal LD50 <43 mg/kg

-Acute Inhalation LC50<100ppm

Listed Carcinogen>0.1% (by weight)

Contains a Persistent or Bioaccumulative Substance at > Listed TTLC

Water Reactive

Is the Waste a Special Waste? (22 CCR 66261.122)

A Special Waste is Hazardous ONLY Because Inorganic Constituents Exhibit:

-Soluble Concentration > STLC

OR

-Total Concentration > TTLC

EXCEPT THAT

-Soluble Concentration in mg/kg must be < TTLC

The Generator Must Apply For and Receive the Special Waste Classification From the Department

Is the Hazardous Waste Mixed with A Non-Hazardous Waste? [22 CCR 66261.3(b)(3)]

A Mixture of Hazardous Waste and a Non-Hazardous Waste is Hazardous Waste only if the Resultant Mixture Exhibits an Article 3 Characteristic

LIST OF LICENSED OIL RECYCLERS IN CALIFORNIA

COMPANY NAME	LOCATION	PHONE NUMBER
D. K. Environmental	Los Angeles	(323) 268-5056
DeMenno/Erdoon	Compton	(310) 537-7100
Evergreen Oil, Inc.	Newark	(510) 795-4400
Global Environmental Systems	Bakersfield	(661) 589-7504
Hydra Fyne, Co.	City of Industry	(626) 369-6580
Industrial Service Oil Co.	Downey	(562) 869-9667
Leach Oil, Inc.	Compton	(310) 323-0226
Ramos Environmental	West Sacramento	(916) 371-5747

For more information on these companies, see California Environmental Protection Agency, Dept. of Toxic Substances Control Alternative Technology Division's DIRECTORY OF INDUSTRIAL RECYCLERS, 1991.

LIST OF LICENSED USED OIL HAULERS IN CALIFORNIA

Refer to Logistics Section 5406

REGIONAL WATER QUALITY CONTROL BOARDS

REGION	LOCATION	CITY	TELEPHONE NUMBER
Region 1	North Coast	Santa Rosa	(707) 576-2220
Region 2	San Francisco Bay	Oakland	(510) 662-2300
Region 3	Central Coast	San Luis Obispo	(805) 549-3147
Region 4	Los Angeles	Monterey Park	(213) 576-6600
Region 5	Central Valley	Sacramento	(916) 255-3000

Region 8	Santa Ana	Riverside	(909) 782-4130
Region 9	San Diego	San Diego	(858) 467-2952

4550 Alternative Response Technologies (ART)

4550.1 Introduction

Alternative Response Technologies (ARTs) available to the UC are discussed in this section. The primary objective of an oil spill response is to reduce the effect of spilled oil on the environment. Physical removal of the oil is the preferred method. However, conventional mechanical recovery and removal may be limited by equipment capability, weather and sea state conditions, the size and the remote location of the spill.

4550.2 Policy

The use of alternative response countermeasures; dispersants, in-situ burning, and other oil spill cleanup agents (OSCAs) including, bioremediants, shoreline cleaning agents, herding agents, and elasticizers shall be considered when the preferred recovery methods, cleanup or remediation techniques are inadequate and the environmental benefit of ART use outweighs any adverse effects.

Use of dispersants or in-situ burning will be the primary consideration for any large off-shore discharges of oil where open water skimming operations may be difficult or where open water recovery could not occur before the oil impacted any of the environmentally sensitive areas located offshore, such as seal rookeries or nesting bird colonies.

Since the approval process for use of ARTs has historically been prolonged and complex, the decision to apply time-critical methods, such as dispersants and in-situ burning, needs to be made early in the response. This section discusses the approval process for dispersants and in-situ burning specifically, as well as approval and use for other OSCAs. The approval process varies with the type of countermeasure and the location of the spill (inland, nearshore, offshore) and in most cases, requires the involvement of the Regional Response Team and the State of California.

4551 Dispersants

4551.1 Background

The following process has been developed by the California Department of Fish and Game, Office of Spill Prevention and Response (OSPR) and the National Oceanic and Atmospheric Administration's Hazardous Materials Response and Assessment Division to provide for the timely and effective use of dispersants for oil spills in marine waters off California.

There are presently two commonly recognized approaches to remove significant quantities of spilled petroleum from marine surface waters. The most common technique involves mechanical skimming devices which typically remove less than 20% of the spilled petroleum (National Research Council [NRC], 1989). The second and more controversial method is the use of chemical agents (e.g. dispersants) to disperse oil into the water column. The effectiveness of chemical dispersants has been reported to range from zero to 100 percent depending on the type of petroleum spilled, the dispersant used, and the approach employed to estimate effectiveness (NRC, 1989). A third approach, in-situ burning, is still in the developmental stage.

Dispersants offer advantages over skimming technology when addressing dispersable oils. These include: dispersants can be applied in offshore or remote areas where the use of skimming vessels may be limited

or response times protracted; dispersants can be used more effectively in sea states where skimming vessels may not be able to operate; and aerial application of dispersants can more quickly address larger areas of spilled petroleum than skimming technology. In addition, dispersants can be used in concert with mechanical skimming devices to increase the rate of surface oil removal.

Dispersion of petroleum into the water column does not alleviate the risk of petroleum-related impacts on the environment. Dispersant application does however, have the potential to accelerate cleanup of spilled petroleum on the surface of the water and at the same time reduce the risk of petroleum-related impacts on environmentally sensitive areas. In the case of California, environmentally sensitive areas include the productive intertidal regions, tidal inlets, tidal marshes and other wetland areas of the coastal islands and mainland and the surface waters where endangered marine mammals and large concentrations of sea birds might exist.

The controversial aspects of dispersants relate primarily to their effectiveness and toxicity. The effectiveness of dispersant application depends on many factors including: type and weathered state of spilled petroleum; the dispersant used; sea state; and application efficiency. It is thus difficult to predict in advance the precise effectiveness of dispersant application at any one spill due to the many controlling variables (NRC, 1989).

A recent review of dispersant toxicity studies (NRC, 1989) suggests that the present generation of dispersants do not themselves present a significant threat to marine life. The primary dispersant related threat to the environment comes from the dispersion of spilled oil constituents into the water column. However, studies show that the acute toxicity associated with dispersed oil is likely to be short term as the dispersed oil is typically diluted within hours to levels below those expected to produce impacts on the water column community. These findings, coupled with the potentially severe consequences to natural living resources when oil is on the water's surface or deposited within the productive intertidal regions, suggest that when possible the dispersion of oil may be the best response choice after an oil spill has occurred.

The California marine oil spill response community relies almost exclusively on skimming technology to recover spilled petroleum in the open ocean. Though dispersants have been used in the past, consideration of and consent for their use has been slowed by the lack of an effective, well reasoned decision-making/approval process. Owing to the logistical constraints and relatively small window of opportunity in which dispersants may be effectively applied, the decision to use dispersants must be made in a timely fashion.

The purpose of this document is to combine an existing Quick Approval Zone policy for use of dispersant in the waters 15 nautical miles or more off the coast of California with California's draft policy for use of dispersants in state waters. The resulting dispersant use decision making policy is designed to address the use of dispersants in all waters off the coast of California.

4551.2 Regional Philosophy

In 1994, the 11th U.S. Coast Guard District and Region IX of the U.S. Environmental Protection Agency (EPA) along with the State of California and other members of the Regional Response Team (RRT), developed a Quick Approval Zone Plan to expedite dispersant use in the offshore water of California at a "safe" distance from environmentally sensitive areas (Region 9 RRT. 1994). The actual area of the Quick Approval Zone (QAZ) is the waters from the Oregon border to a point 15 nautical miles from the Mexican border (to provide the Mexican government with input into dispersant use decisions that may

affect their waters), and west from a line 15 nautical miles from the nearest point of land and extending out to the western most limits of the national Exclusive Economic Zone (Figure 1). Special cases were made for offshore islands which also had a 15 nautical mile dispersant use buffer zone. The separation of the QAZ from California waters was undertaken to accommodate the State until it could develop a dispersant decision process for California waters including the environmentally sensitive near shore areas as required by State statute.

The QAZ Plan was a streamlined dispersant use checklist process to provide the Federal On Scene Coordinator (FOSC), who is the federal representative in the Unified Command (UC), with a mechanism to secure RRT permission or denial for dispersant use within one to two hours.

Until the present, the State had no uniform published approach or guidelines for dispersant use. In early 1995, the OSPR finalized a "draft" Dispersant Use Decision Process (DUDP) pursuant to State statutory requirements which addressed the use of dispersants in State waters (OSPR, 1995). The purposes of the 1995 document were to provide: a written position and guidelines for dispersant use in state waters; a process for incorporating dispersant efficacy and biological resources data into the decision making process; and a speedy DUDP for examining dispersant.

While the QAZ process was designed to provide a quick dispersant response in waters away from environmentally sensitive areas, the State's DUDP was designed to protect the most environmentally sensitive areas, when possible, through selected dispersant use. In general, the State has identified environmentally sensitive areas as the near shore surface waters, including those surrounding the offshore islands of the state, where endangered marine mammals and thousands to hundreds of thousands of sea birds may exist at any one time and the highly productive tidal inlets and intertidal regions of the mainland and offshore islands.

The State's premise on dispersant use is that in general, petroleum on the surface of the ocean poses more of an immediate and long term risk to living marine resources and habitats than petroleum dispersed into the water column. There are exceptions to this approach and they are identified in the Quick Approval Process (QAP) boundary definition and discussed in the QAP Checklist backup material provided in Appendix I.

4551.2.1 QAP for Dispersant Use in Waters off California

If a dispersant response is to be successful it must typically be undertaken within a small window of opportunity following the release of oil, which often can be measured in hours. In order to accomplish such a task, the UC must have a mechanism at their disposal to expedite the dispersant use decision. The QAP, a combination of the existing federal QAZ and the State's draft DUDP, is such a mechanism. This accelerated review process, conducted by the Planning Section of the UC, is designed to provide the UC with sufficient information to determine if a dispersant use request should be made, and to provide members of the RRT with sufficient information to approve or disapprove within the first two hours of its receipt. This information is provided through the use of an Incident Command (IC) decision making process and support documents. If the results of the decision making process supports dispersant use, the FOSC, representing the UC, will contact the RRT, provide information as required, and obtain a dispersant use decision.

The purpose of the QAP approach is to take advantage of the time-restricted dispersant-use window-of-opportunity. If the UC requests the use of dispersants, based on the QAP process, to address an oil spill and the RRT provides approval for dispersant use, there must be an understanding by both parties that: (1) the use of dispersants represents an acceptable risk to the environment; (2) the selected dispersant will have an

acceptable level of effectiveness on the spilled oil; (3) dispersant application will not disperse all of the spilled oil; and (4) mechanical or other methods will be required to address the remaining oil.

4551.3 Authority

The National Contingency Plan, Section 300.910 authorizes the OSC, with the concurrence of the EPA representative to the RRT and, as appropriate, the concurrence of the State representative to the RRT with jurisdiction over navigable waters threatened by the release of discharge (of oil) and in consultation with the DOC and DOI natural resource trustees, when practicable, to authorize the use of dispersants. The Commandant of the USCG has predesignated the USCG Captains of the Port under his jurisdiction of On-Scene Coordinators for oil spills, and has delegate authority and responsibility for compliance with Section 311 of the Federal Water Pollution Control Act to them. The USEPA has been delegated authority under Subpart J of the NCP to authorize use of dispersants for control of oil spills.

California Government Code Section 8670.7(f) delineates the Administrator of the Office of Spill Prevention and Response, Department of Fish and Game as having the State authority over the use of all response methods, including, but not limited to dispersants. The Governor of the State of California has delegated state representation on the RRT to the Administrator of the OSPR.

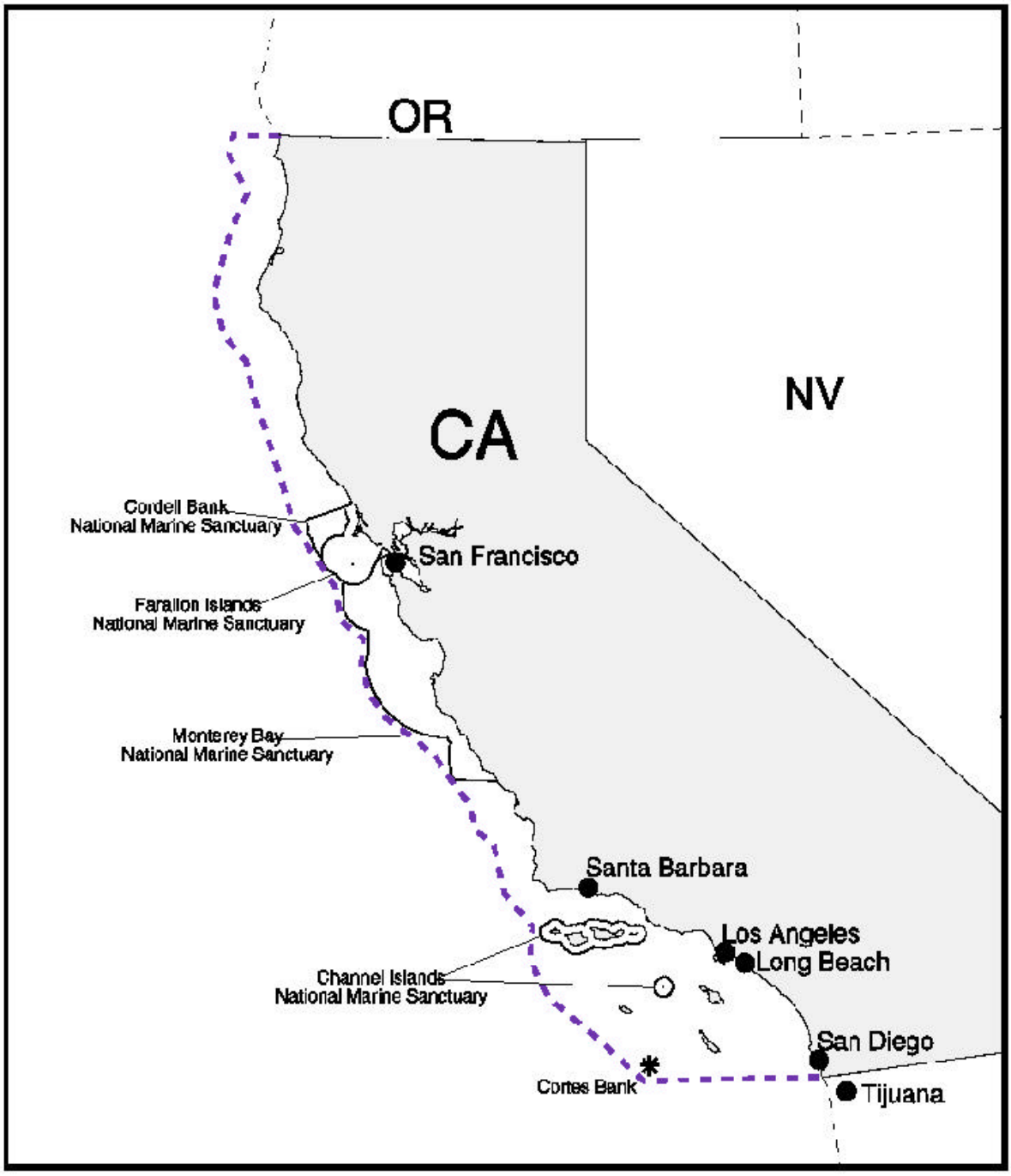
4551.4 Annual Review

It will be the charge of the RRT ART Working Group to annually review the QAP Plan and report its findings to the RRT at a scheduled meeting. The group will be responsible for the administrative upkeep of the contact list as well as insuring that the plan is updated to reflect any changes in regional polices (including those of Region X, the state of Oregon and Mexico), and technological advances.

Boundary of "Quick Approval Zone"

State of California

USE ONLY AS A GENERAL REFERENCE Boundaries are intended as a general reference only



4551.5 Guidelines: QAP Boundary Definition

The geographic boundaries of the QAP are those marine waters off the coast of California which occur between lines drawn perpendicular to the Oregon/California border and to a point 15 nautical miles from the California/Mexican border. A fifteen nautical mile exclusion zone is provide from the Mexican border to ensure the sovereignty of the waters of Mexico. Dispersant use in these waters will require coordination with the Joint Response Team. Offshore, the QAP extends seaward to the western most limits of the Exclusive Economic Zone. Inshore, the QAP is limited to those waters beyond a depth of 60ft, and a distance of .5 miles from the mainland and island shorelines or kelpbeds. In addition, dispersant use is excluded from a one mile radius around the mouths of rivers having significant salmon and steelhead trout runs during peak periods of adult and smolt migration.

4551.5.1 Marine Sanctuaries

Marine Sanctuaries comprise a significant fraction of the coastal waters off California. The use of dispersants in the Sanctuaries will require considerable coordination with the Sanctuary Managers and their staff. Though Sanctuaries are represented by the Department of Commerce delegate on the RRT, the Sanctuary Manager and/or staff members will be requested to take part in the QAP process through their participation in the UC Planning Unit's Alternative Response Technology (ART) section. The Sanctuaries can provide resource data and insight necessary to the QAP process that may otherwise not be available to the UC in a timely manner, thus their participation can be crucial.

4551.5.2 Observation and Monitoring

Monitoring of dispersant effectiveness is desirable and should be conducted, if practical, during any dispersant application. That said, predicating the use of dispersants on the presence of in-place monitoring equipment is not appropriate. Dispersant application should not be delayed should sea conditions, equipment failure, or other unavoidable circumstances preclude the positioning of monitoring equipment and personnel. If the UC requests the use of dispersants and the RRT approves their use there must be an understanding by all parties that the use of dispersants represent an acceptable risk to the environment and the dispersant will have a acceptable level of effectiveness on the spilled oil.

Until recently, there has not been a standardized approach to monitor the effectiveness of dispersant application at sea. A working group of federal scientist and oil spill responders has recently developed the Special Monitoring of Advanced Response Technologies (SMART) program to monitor the effectiveness of alternative response technologies including dispersants. The dispersant SMART program provides a process to rapidly gather information on the effectiveness of dispersant application and provide the information to the UC in a timely manor. The SMART program consists of both visual observations (Tier 1) and on-site water column monitoring (Tier 2). In addition, the program can be expanded to examine the fate and transport of the dispersed oil (Tier 3). Once this program is finalized, it will provide a practical and cost effective approach to effectiveness monitoring and should be incorporated into QAP program.

4551.5.3. Incident Command Dispersant Quick Approval Process

To ensure a streamlined operation, the IC Quick Approval Dispersant Decision Process (Appendix I) and support documents addressing on-water cleanup equipment availability, spill information, and biological resources at risk (Appendix III) shall be completed by the ART Unit of the UC Planning Section with

assistance form the OSPR operations center in Sacramento. Information on biological resources at risk and dispersant effectiveness will be obtained from the OSPR data base. Results of the QAP review, supporting information, and dispersant use recommendation will be summarized on the FOSC Check List (Appendix II) and forwarded to the IC.

4551.6 Procedures for the QAP

1) The FOSC contacts the proper agency representatives on the RRT (Appendix IV) and informs them that a request to utilize dispersants may be forthcoming.

2) ART Unit of Planning Section completes the Quick Approval Dispersant Decision Process (Appendix I) and submits summary of findings and information to UC on FOSC Checklist form (Appendix II).

3) If check list indicates that dispersant use is appropriate (all checklist questions answered yes), FOSC schedules conference call with RRT representatives or alternates at first reasonable opportunity (eg. one to two hours prior to first dispersant flight).

4) Conference call is conducted and Yes/No decision made based on information provided on FOSC Checklist.

5) If a "YES" decision is made then overflights will be conducted prior to the dispersant application to confirm that natural resources are not being threatened by the planned operation. Dispersant application will be canceled if it is determined that an unacceptable threat to resources exist. Weather permitting, at a minimum aerial surveillance will be conducted to monitor the effectiveness of the dispersant application. If possible water column monitoring will also be conducted to examine dispersant effectiveness. Information gathered from these platforms will be relayed to the UC for further consideration.

4551.7 References

National Research Council. 1989. Using Oil Spill Dispersants on the Sea. Committee on Effectiveness of Oil Spill Dispersants,

Marine Board, Commission on Engineering and Technical Services.
National Academy of Science, Washington DC. 335pp.

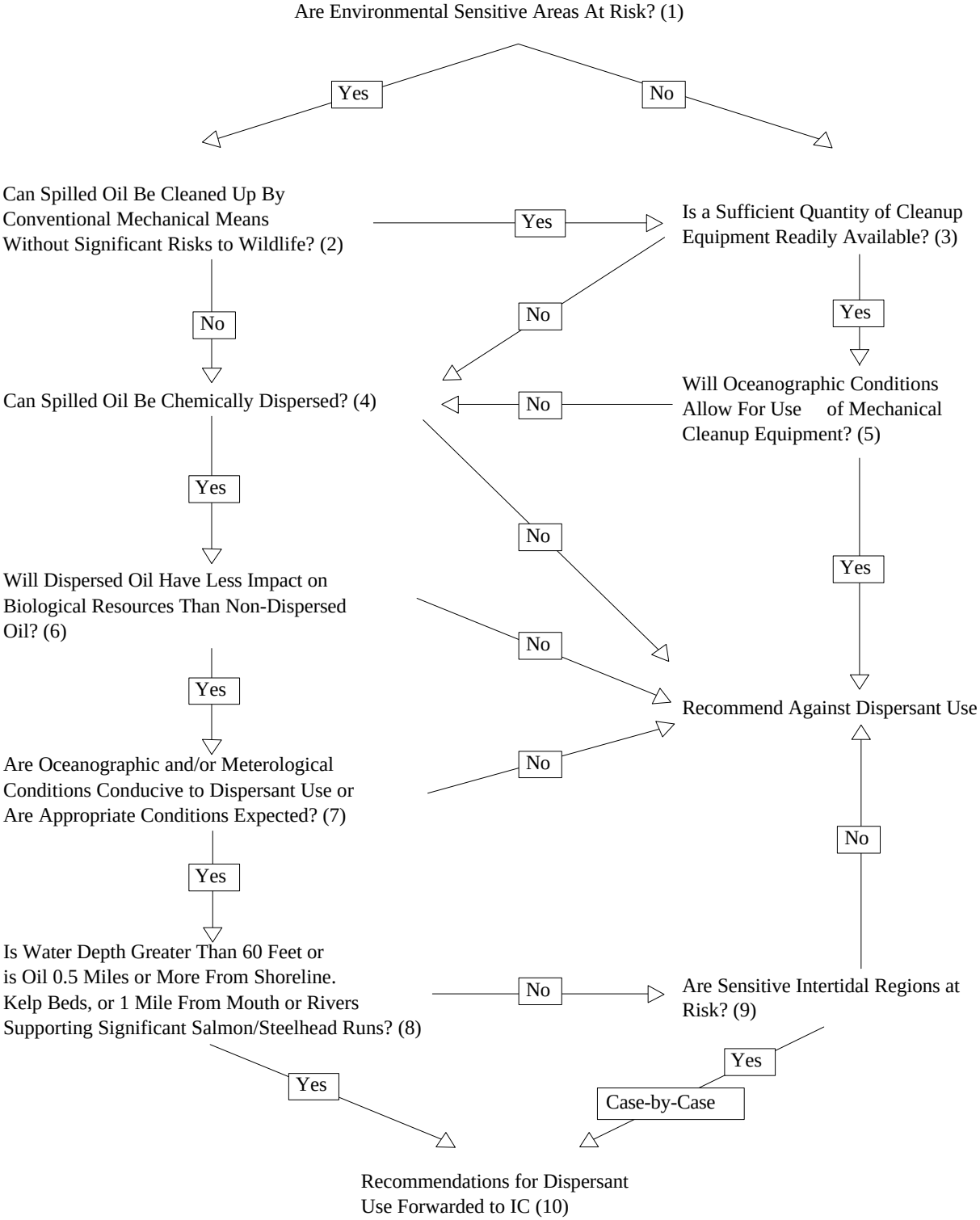
OSPR. 1995. Draft Decision Use Document for Dispersant Use In California Waters. 4pp

Region 9 RRT. 1994. Quick Approval Zone Plan. 4 pp. plus Appendices

APPENDIX I
QUICK APPROVAL PROCESS

Revised: 01/01/00

QUICK APPROVAL DISPERSANT USE DECISION PROCESS



QUICK APPROVAL PROCESS

The following discussion addresses the 11 decision points identified in the Quick Approval Process for dispersant use in marine waters. The discussion briefly identifies the importance and justification or rationale for each point. The numbered points correspond to the numbers in parentheses in the Quick Approval Process presented on the previous page..

1. Most of the marine waters off California must be considered environmentally sensitive areas due to the presence of foraging seabirds, migrating marine mammals, offshore islands with their marine mammal rookeries and haul outs, seasonal fish migration, and the productive rocky intertidal and subtidal regions and associated kelp forests.

2. Can the volume of spilled oil be addressed effectively by mechanical means in a timely manner or is the volume beyond the capabilities of available mechanical equipment resulting in a significant threat to wildlife and environmentally sensitive areas in the general region of the spill? This question must be considered in the first hours of a spill and can not be put off until mechanical equipment is deployed, otherwise the dispersant use window of opportunity will be missed.

3. Is the spill site significantly isolated (e.g. northern most coastal reaches of the state) to preclude the rapid deployment of mechanical cleanup equipment? If so, should dispersants be considered for use as a first response tool where conditions will allow?

4. Have laboratory tests demonstrated that spilled petroleum can be dispersed by available dispersants? What are the reported efficacy values of available disperants? There must be some reliable evidence, either from the laboratory or field trials, that suggests that an available dispersant will effectively disperse the spilled petroleum.

5. Do oceanographic conditions preclude the effective use of mechanical cleanup equipment? If so, dispersants may be the only response option available.

6. The selection of dispersants as a cleanup/response tool is made using the hypothesis that spilled petroleum on the surface of the water (and eventually on the shore line) is more of a threat to natural resources that petroleum dispersed in the water column. The hypothesis is tested using a data base that presents the resources at risk, both on the surface of the water and within the water column by season, and how exposure to oil might affect the exposed species on a population basis. The risk analysis is based on the effects of petroleum on the populations at large and not the individual animal.

7. The application of dispersants is extremely difficult in foggy and heavy wind conditions. In addition, on days with little or no winds and calm sea conditions, there may not be sufficient mixing energy to mix oil and dispersant.

8. Results of the dispersant field studies suggest that dispersed oil concentrations below a depth of about 30ft are typically far below levels found to cause mortality in laboratory tests. Based on these observations, it has been suggested that dispersant operations can be carried out in water depths greater than 30 ft without fear of significantly impacting benthic communities. To increase the margin of protection for benthic communities, a safety factor of 2x is imposed, therefore the minimum water depth for dispersant use should be >60ft.

There are areas along the coast where kelp beds extend into waters of a depth of 60ft or greater. The existence of the kelp beds can significantly affect local oceanographic conditions through the depression of the water column mixing and wave action. The presence of kelp beds could significantly affect the dispersion of the chemically dispersed oil and/or trap the dispersed oil along or within its boundaries. Further, the use of dispersants in or near a kelp bed would pose a significant threat to the highly productive community inhabiting both the floor and water column regions of the bed.

There are also areas along the coast where waters in excess of 60ft exist adjacent to the shore line (e.g. Channel Islands, and areas of the coast with submarine canyons). the use of the 60ft depth criteria for dispersant application in these waters would not provide the mixing area or protection for the inshore habitat as intended. To ensure appropriate mixing depth and protection to the inshore habitat, the following are required.: 1) water depth of > 60ft.; 2) a minimum of 0.5 miles from a kelp bed; and, 3) a minimum of 0.5 miles from the shore line.

Along the coast of northern California exist several rivers and streams that support significant populations of salmon and steelhead trout. To protect the migration of adults and smolt to and from these rivers, a one mile radius dispersant use exclusion zone, measured from the mouth of the river/stream, shall exist during peak migration periods.

9. There may be times when dispersant application should be considered in water depths less than 60ft or areas closer than 0.5 miles from shore to protect a particular sensitive habitat or species. The use of dispersants in these regions will be reviewed on a case-by-case basis and will nor fall under the Quick Approval Process procedures.

10. If dispersant application is considered for waters within or adjacent to federal sanctuaries, seashores, parks, and similar protected areas, the managers of the area must be notified and so apprised. Actual permission for the use of the dispersant in these areas and the limitations for dispersant use must be developed prior to including these areas in the Quick Approval Process.

11. Once the Checklist is completed and a decision for dispersant use generated, the FOSC will forward their request, along with any other requested data, to the RRT via a phone conference. Based on the information provided, the RRT will provide an approval/disapproval decision for dispersant use.

APPENDIX II FOSC CHECKLIST

The FOSC Checklist is used by the Federal Incident Commander to determine whether a request should be forwarded to the Regional Response Team for dispersant use. All of the criteria below must be met before a request is made.

Checklist:

1. Is the spilled petroleum dispersable? Y/N

2. Is the appropriate equipment available for dispersant application? Y/N

3. Is a sufficient quantity of dispersant available to respond to the spill? Y/N

4. Are weather and oceanographic conditions favorable for dispersant application? Y/N

5. Does the dispersion of spilled petroleum to the water column pose less of an environmental risk than leaving the petroleum on the sea surface? Y/N

6. Will the area of dispersant application fall within established water depth and distance boundaries identified in the approval process? Y/N

7. If required, have state and international boundary considerations been addressed? Y/N

8. Has the ART Unit recommended the use of dispersants? Y/N

Basic information regarding the spill (weather, location of slick, type of oil, trajectory analysis, resources at risk, etc.) -see attached forms.

Phone Call List (refer to Appendix IV of QAP)

EPA Y/N

USCG Y/N

DOC Y/N

DOI Y/N

California Y/N

APPENDIX III
Support Information For
Quick Approval Process

1. On-Water Mechanical Cleanup Equipment Availability

Equipment Type	SkimmingCapacity	Estimated time of Arrival
1.		
2.		
3.		
4.		
5		
6.		

2. Spill Information

A. Incident Information:

Cause of Spill:

Date and Time of Spill:

Location:

Volume and Type of Release (Continuing vs Instantaneous)

Potential Volume to be Released:

B. Characteristics of Spilled Oil:

Oil Type/Name:

Specific/API Gravity: Flash Point:

Pour Point: Viscosity:

C. Dispersant Information:

Available Dispersants and Amounts:

Laboratory Data on Dispersability of Oil:

Weather and Water Conditions/Forecast:

Water Temp: Air Temp:

Current Information:

Wind Speed/Direction (present and 48hr projection:

Salinity: Water Depth:

Sea- State and 48Hr Projection:

Tide Information and 48hr Projection:

Comments:

E. Oil Trajectory Information

Surface Area of Slick:

24hr Slick Trajectory:

48hr Slick Trajectory:

Expected Land Fall (Location):

Comments:

3. Biological Resources at Risk
(Provided by OSPR)

A. On-Water Resources:

B. Shallow Subtidal Resources:

C. Intertidal Resources:

D. Anadromous Resources:

E. Significant Water Column Resources:

APPENDIX IV RRT CONTACT LIST

Name/Agency		Contact Number
A. Environmental Protection Agency		
Bill Robberson		415-744-2332 415-744-1796 FAX 415-885-4357 Home
	1-800-581-1372	PIN#879-0962 Pager
EPA Alternate 1: Michael Feeley		415-744-2219
	1-800-759-888 Pager	PIN#2832870
B. United States Coast Guard		
CAPT Frank Whipple		510-437-2942 510-437-2961 FAX
	1-800-800-8689 Pager	PIN#714400334086
USCG Alternate 1: CDR John Koster		510-437-2956
USCG Alternate 2: CDR Ron Hassler		510-437-2945
C. Department of the Interior		
Pat Port		415-744-4090 415-744-4121 FAX 415-431-4884 Home
DOI Alternate: Regional Environmental Assistant (TBD)		
DOI Alternate: Regional Biologist:		
Northern California	Jim Hass	916-978-5603
Central California	Steve Henry	805-644-1766
Southern California		619-431-9440

D. Department of Commerce

NOAA SF Bay Site Manager		415-556-0858
		415-556-8507 FAX
	1-800-Sky-Page Pager	PIN 1979797
DOC Alternate 1:		
Dave Kennedy		206-526-6317
		206-526-6329 FAX
	1-800-Sky-Page Pager	PIN 5798801
DOC Alternate 2:		
HAZMAT Duty Officer		206 526-6317

E. California Department of Fish and Game/OSPR

Don Lollock		916-445-8285
		916-323-4407 FAX
		916-360-5276 Pager
State Alternate 1:		
Rob Floerke		916-445-9326
		916-857-2572 Pager

F. NOAA/HAZMAT

Scientific Support Coor.		
Heather Parker-Hall		510-437-5344
		510-437-5345 FAX
	1-800-SKY-8888	PIN 5798818

4552 In-Situ Burning

4552.1 Background

There are presently two commonly recognized approaches to remove significant quantities of spilled petroleum from marine surface waters. The most common technique involves mechanical skimming devices which, for large spills, typically remove less than 20% of the spilled petroleum (National Research Council, 1989). The second and more controversial method is the use of chemical agents (e.g., dispersants) to disperse oil into the water column. The effectiveness of chemical dispersants has been reported to range from zero to 100% depending on the type of petroleum spilled, the dispersant used, and the approach employed to estimate effectiveness (National Research Council, 1989).

Burning has distinct advantages over other oil spill countermeasures. It offers the potential to rapidly convert large quantities of oil into its primary combustion products with a small percentage of other unburned and residue byproducts (Evans et al., 1992). This technique could be the most effective of all in dealing with a large spill at sea and in removing large quantities of oil from the water environment before it comes ashore (S.L. Ross Environmental, 1990). Until recently, this response technology has not been regularly used, due largely to the lack of understanding of the combustion products and the principles governing the combustibility of oil-on-water (Evans, et al., 1992) as well as the lack of the equipment necessary to carry out a burn within the window of opportunity. Much of the renewed interest in in-situ burning has resulted from years of study of both the dynamics of burning oil on the water and the combustion products produced during an in-situ burn.

In-situ burning removes the surface oil by driving much of it into the atmosphere in the form of combustion gases and soot. As such, in-situ burning reduces the environmental threat and impacts posed by on-water spills but only at the cost of increasing the potential threat posed by the airborne plume. In-situ burning, however, does have the potential to accelerate cleanup of spilled petroleum on the surface of the water and at the same time reduce the risk of petroleum-related impacts on environmentally sensitive areas. In the case of California, environmentally sensitive areas include the productive intertidal regions, tidal inlets, tidal marshes and other wetland areas of the coastal islands and mainland, and the surface waters where endangered marine mammals and large concentrations of sea birds might exist. The problem for decision makers is to compare the effects of burning versus not-burning and choose the option that provides the greatest net benefit to the environment, without causing undue public health impacts. Every oil spill situation is unique. Weather and seastate conditions that are most favorable for mechanical cleanup (calm winds and seastate), are not favorable for dispersants. However, dispersants might be the best response option in remote off-coast areas with choppy seas. Although limited by the ability to contain oil, in-situ burning might be the best option in areas where it is imperative to remove large quantities of oil quickly to protect on-water resources (such as in the sea otter range or the Farallon Islands). It is important that all response options be available for use at the time of a spill so that the best, most appropriate response can be used.

4552.2 Regional Philosophy

The primary object of oil spill abatement and cleanup is to reduce the adverse effect of spilled oil on the environment. Physical removal and subsequent disposal or recycling/re-use is the preferred method. However, mechanical recover may be limited by equipment capability, weather and sea state, storage and disposal problems, and spill magnitude. Use of in-situ burning may be considered by the OSC when the preferred recovery techniques are inadequate and in-situ burning will lessen the environmental impacts of the spill.

4552.3 Authority

The National Contingency Plan, Section 300.910 authorizes the OSC, with the concurrence of the EPA representative to the RRT and, as appropriate, the concurrence of the State representative to the RRT with jurisdiction over navigable waters threatened by the release of discharge (of oil) and in consultation with the DOC and DOI natural resource trustees, when practicable, to authorize the use of in-situ burning on a case-by-case basis. The Commandant of the USCG has predesignated the USCG Captains of the Port under his jurisdiction of On-Scene Coordinators for oil spills, and has delegate authority and responsibility for compliance with Section 311 of the Federal Water Pollution Control Act to them. The USEPA has been delegated authority under Subpart J of the NCP to authorize use of in-situ burning for control of oil spills.

California Government Code Section 8670.7(f) delineates the Administrator of the Office of Spill Prevention and Response, Department of Fish and Game as having the State authority over the use of all response methods, including, but not limited to in-situ burning. The Governor of the State of California has delegated state representation on the RRT to the Administrator of the OSPR.

4552.4 Annual Review

It will be the charge of the RRT ART Working Group to annually review the use of in-situ burning and report its findings to the RRT at a scheduled meeting. The group will be responsible for the administrative upkeep of the contact list as well as insuring that the plan is updated to reflect any changes in regional polices (including those of Region X, the state of Oregon and Mexico), and technological advances.

4552.5 In-Situ Burn Decision Guidelines

(a) Preapproval Zone

This zone is designated in the "Letter of Agreement (LOA) Between US Coast Guard, US EPA, US Department of Commerce and the US Department of the Interior Concerning the Use of In-situ Burning as a Response Method to Oil Pollution for areas 35 - 200 nautical miles off the California coast. Preapproval areas are defined as those areas 35 to 200 miles off the California Coast and the areas around special jurisdictions, such as the Marine Sanctuaries, National Parks and National Wildlife Refuges, Department of Defense reservations or other jurisdictions at San Nicholas and San Clemente Islands, and any other Federal lands or jurisdictions. The FOSC will determine if conditions are met to authorize an in-situ burn as delineated in the Letter of Agreement and notify the RRT and the California Department of Fish and Game as soon as feasible after the decision is made.

(b) Case-by-Case Zone

Case-by-case areas are defined as those areas not designated within the preapproval zones. This includes all marine waters within 35 miles off the California coast as well as areas of special jurisdiction as detailed above. The FOSC will obtain approval from the EPA representative to the RRT and the California Department of Fish and Game (CDF&G) representing the State of California. Whenever fish or wildlife resources may be affected, the EPA and State representative to the RRT may consult with the DOI and DOC natural resource Trustees, including Sanctuary Managers as applicable.

4552.6 Preapproval Process

The following is a Letter of Agreement among the U.S. Coast Guard, U.S. Environmental Protection Agency (EPA), National Oceanic and Atmospheric Administration (NOAA) and U.S. Department of the Interior (DOI) discussing the potential use of I*n-situ* Burning in Federal waters (35-200 miles). It includes an In-Burning Plan, In-Situ Burn Monitoring Plan, Site Safety Plan for *In-Situ* Burning, and In-situ Burn Boom Operations Procedures.

Revised: 01/01/00

LETTER OF AGREEMENT

AMONG

US COAST GUARD (USCG),

US ENVIRONMENTAL PROTECTION AGENCY (USEPA),

US DEPARTMENT OF COMMERCE,
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION (NOAA),

AND

US DEPARTMENT OF THE INTERIOR

CONCERNING THE USE *IN-SITU* BURNING AS A

RESPONSE METHOD TO OIL POLLUTION

FOR THE AREA 35-200 NAUTICAL MILES OFF THE CALIFORNIA COAST

PURPOSE

The Region IX Mainland Regional Response Team (RRT-IX Mainland) recognizes that mechanical recovery, *in-situ* burning and chemical dispersants are the three primary means of dealing with oil discharges into the waters of the United States. While mechanical removal is the preferred method, the RRT-IX Mainland recognizes that *in-situ* burning is a viable option in conjunction with, or in lieu of mechanical or other types of recovery. The purpose of this Letter of Agreement is to provide concurrence of the US Environmental Protection Agency (USEPA) representative, the US Department of the Interior (DOI) representative, and the US Department of Commerce (DOC)-National Oceanic and Atmospheric Administration (NOAA) representative for the use of *in-situ* burning for oil discharges on the waters within the jurisdiction of the RRT-IX Mainland 35-200 nautical miles off the Coast of California within the geographical boundaries described in Geographical Boundaries, Page two. This concurrence is given to the federally pre-designated US Coast Guard Federal On-Scene Coordinators (FOSC). This agreement gives guidelines to allow the FOSC to use *in-situ* burning in a timely manner to: (1) prevent or substantially reduce a hazard to human life; (2) minimize the adverse environmental impact of the spilled oil, and (3) reduce or eliminate, the economic or aesthetic losses of recreational areas.

This agreement for pre-approval is necessary, due to the time constraints under which burning is a viable option. In developing this pre-approval agreement, the environmental impacts associated with an on-water oil burn have been evaluated in relationship to other mechanical and chemical alternatives. It is the view of the signatories that the overall environmental benefits of *in-situ* burning out weigh the relative environmental costs, except in those circumstances noted in this agreement.

If the conditions for pre-approval are not met, selected representatives in the RRT-IX Mainland must be involved prior to commencing with any *in-situ* burn. In accordance with the provisions of the National Contingency Plan, this means that the concurrence of the US EPA representative to the RRT, in

consultation with the natural resource trustee Federal agencies, is required. If the burn is being considered within the area 0-35 nautical miles off the California Coast, consultation with the State of Califomia representative to the RRT-IX Mainland is also required. If the burn is being considered within State waters, the concurrence of the State of California representative is required.

AUTHORITY

Subpart J of the National Oil and Hazardous Substances Pollution Contingency Plan (the National Contingency Plan or NCP) provides that the Federal On-Scene Coordinator (FOSC) with the concurrence of the US Environmental Protection Agency (USEPA) representative to the Regional Response Team (RRT) and the concurrence of the State with jurisdiction over the navigable waters polluted by the oil discharge, may authorize the use of *in-situ* burning of oil spills. The Commandant of the US Coast Guard has predesignated the USCG Captains of the Port under his jurisdiction as On-Scene Coordinators for oil spills, and has delegated authority and responsibility for compliance with Section 311 of the Federal Water Pollution Control Act (FWPCA), as amended, to them. The Governor of the State of California has delegated responsibility to coordinate State approval for proper usage of *in-situ* burning for control of oil spills within State waters to the State of California Office of Oil Spill Prevention and Response (OSPR), within the Department of Fish and Game (DFG). The USEPA has been delegated authority under Subpart J of the NCP to authorize use of *in-situ* burning for control of oil spills.

SCOPE

The USCG, USEPA, NOAA, and DOI agree that the physical removal of discharged or spilled oil from the water surface is the primary method of control. Furthermore, it is recognized that the most effective response to an oil spill may include a combination of mechanical recovery, *in-situ* burning and dispersant or other chemical use. As such, this Letter of Agreement sets guidelines under which *in-situ* burning may be used by the USCG Federal On-Scene Coordinator on or in Federal waters 35-200 nautical miles off the Coast of California - waters which are also within the boundaries of the Eleventh Coast Guard District.

GEOGRAPHICAL BOUNDARIES

The geographical area covered by this Agreement is the Pacific Ocean at a distance 35-200 nautical miles from the Mainland California Coast.

PROTOCOLS

As attested to by the signatures set forth below, the USEPA, the USDOC-NOAA, and the USDOI agree with the USCG that the pre-designated USCG FOSC may consider the use of *in-situ* burning of oil discharges, as defined in the NCP, in accordance with the following guidelines.

GUIDELINES

1 . As per the NCP, 40 CFR Part 300.120, the authority to use *in-situ* burning of oil discharges in accordance with this Agreement is vested in the pre-designated USCG FOSC. The pre-designated USCG FOSCs along the California Coast are the Captain of the Port of San Francisco, the Captain of the Port of Los Angeles-Long Beach, and the Captain of the Port San Diego. This authority may not be delegated.

2. The USCG FOSC may authorize the use of *in-situ* burning without obtaining the concurrence of the USEPA representative or the Federal natural resource trustee representatives to the RRT-IX Mainland,

when, in the FOSC's judgment, human life is threatened or when all of the following three conditions are met:

A. *In-situ* burning is a viable option for oil removal; and

B The potential plume caused by the burn will not expose unprotected human populations to more than 150 ug/m3 of particulates less than 10 microns in diameter averaged over a one-hour period as determined by the FOSC (on-scene worker safety shall be addressed by the Site Safety Plan, meeting OSHA requirements); and

C. The plume or heat from the burn will not result in greater impact to sensitive wildlife resources than would the spilled oil (in situ Burning Checklist information shall be compiled by the FOSC in advance of the burn).

3. Mechanical recovery equipment shall be mobilized on scene, when feasible, as a backup capability should *in-situ* burning prove ineffective

4. Wind patterns will be predicted by the NOAA SSC, and will be monitored in real time prior to and during the burn by the FOSC. If the prevailing wind direction is either parallel to the shore or away from the shore, it will be assumed that there is no unprotected human exposure above 150 Ug/M3 of particulates less than 10 microns in diameter averaged over a one-hour period as determined by the FOSC.

5. A designated Federal agency representative will be on scene to observe the burn and the prevailing wind direction. If practical, so as not to create an unnecessary delay, monitors from the DOI and DOC-NOAA will be provided the ty to observe the burn and record results. Any of these observers/monitors has the authority to halt any burn if he observes that the conditions in Paragraph 2 are no longer true. The protocol for observing and halting a burn is described in the *In-situ* Burning Monitoring Plan (Appendix III).

6. In any case where the circumstances do not meet the criteria set forth in Paragraph 2, the pre-authorized use of *in-situ* burning is not authorized.

7. If the FOSC feels *in-situ* burning should be used in areas not met by Paragraphs 2.A., 2.B., 2.C., or in areas not part of the pre-authorized geographical boundaries, the FOSC must request approval from the pertinent RRT-IX Mainland member agencies, in accordance with the NCP requirements. The FOSC shall submit the request along with the required information listed in the provided *in-situ* Burning Checklist.

8. Burning will be conducted by trained professionals using recognized techniques and technology.

9. Burning will be conducted in a way that allows for rapid controlling and stopping of the burn to account for wind shifts. When a decision is made to conduct a burn operation, the FOSC shall notify the USCG Co-Chair for the RRT-IX Mainland. The Co-chair shall notify the signatories of this agreement immediately.

10. Contained burning is recognized as the preferred method of burning, using burn resistant boom or similar technology. The ignition of slicks is not permitted if there is a significant chance of igniting the source or if there is a significant hazard to adjacent structures or vessels.

DOCUMENTATION, MONITORING AND EVALUATION

1. NOTIFICATION AND REPORTING TO THE RRT. If the FOSC decides to conduct an *in-situ* burn, a description of the operation shall be documented and submitted to the RRT-IX Mainland as soon as possible following the burn. Typical information to be included is listed in Appendix II (an example of the *in-situ* Burning Plan from the Oceania RRT), Appendix III (an example of the *in-situ* Burning Monitoring Plan from the Oceania RRT), and Appendix IV (an example of the *in-situ* Burn Site Safety and Health Plan from the Oceania RRT). These appendices must be modified as appropriate so that information provided is geographically pertinent to the given *in-situ* burn conditions. The evaluation noted in Paragraph 3 of this section will be completed as part of the FOSC Report. An FOSC Report shall be required whenever an *in-situ* burn is conducted.

2. DOCUMENTATION. The FOSC will ensure that all information described in the previous Paragraph 1 is documented.

3 . MONITORING. The Federal natural resource agencies and the USCG will conduct monitoring of the *in-situ* burn in general accordance with the example *In-situ* Burning Monitoring Plan, attached as Appendix III. As part of the Monitoring Plan, oil samples shall be taken prior to the burn and samples of any floating residue shall be taken following the burn.

4. EVALUATION. The FOSC shall include a full evaluation of all *in-situ* burning applications in any FOSC report following an incident. The report should comment on burn (s), supported by visual record (video, photos) and parties. Data should include estimates of product and analysis of oil residue.

Federal resource agencies shall evaluate the *in-situ* burning to assess environmental and endangered species impacts after ignition.

5. NOTIFICATION OF STATE AGENCIES. The State of California representative to the RRT-IX Mainland (representative from OSPR, DFG) will be notified, along with the other RRT representatives in accordance with Paragraph 1. of this Section. The State representative will be responsible for notifying other appropriate State and, local agencies.

6. OTHER NOTIFICATIONS. The USCG is responsible for notification of neighboring regions (RRT-Region X) and Mexico - depending upon the location of the *in-situ* burn site.

AMENDMENTS

This Letter of Agreement will be reviewed annually and amended as appropriate.

This Letter of Agreement may be amended in writing in whole or in part as is mutually agreeable to all parties thereto.

This Letter of Agreement may be canceled by any party hereto upon thirty (30) days written notice to the other parties.

DATE

//s//
KATHLEEN G. SHIMMIN 4/10/97
USEPA REGION IX
CO-CHAIR, RRT-IX MAINLAND

//s//
WILLIAM H. BOLAND 4/10/97
CAPTAIN, US COAST GUARD
CO-CHAIR, RRT-IX MAINLAND

//s//
DAVID M. KENNEDY 4/10/97
US DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
REPRESENTATIVE TO THE RRT-IX MAINLAND

//s//
PATRICIA SANDERSON PORT 4/10/97
US DEPARTMENT OF THE INTERIOR
REPRESENTATIVE TO THE RRT-IX MAINLAND

Appendix I Overview of *In-situ* Burning as an Oil Spill Response Tool

Appendix II *In-situ* Burning Plan [this Appendix is an example of the information pertinent to *in-situ* Burning; it was developed for Oceania and must be adapted for the area off the California Coast]

Appendix III *In-situ* Burning Monitoring Plan [this is an example from Oceania, and it must be adapted for the area off the California Coast]

Appendix IV Site Safety Plan for *In-situ* Burning - [Oceania Site Safety Plan included as example; some language has been adapted for the area off the California Coast]

Appendix V *In-situ* Burn Boom Operations Procedures [Oceania version included as example; Region IX-Mainland version to be developed by those involved in Unified Command Operations phase]

Appendix VI Resolution of Questions Re LOA

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APPENDIX I OF ISB LOA

OVERVIEW OF INSITU BURNING AS AN OIL SPILL RESPONSE TOOL

Burning has distinct advantages over other spill response tools. First, it offers the potential to remove large quantities of oil rapidly from the environment. *In-situ* burning could potentially remove as much oil in one day as mechanical methods could in one month. In addition, *in-situ* burning could prevent a large amount of shoreline contamination and injury to biota by removing oil before it spreads and moves to other areas. Second, *in-situ* burning requires less equipment and personnel than do other response tools. It can be used in areas where other methods cannot because of distances and lack of infrastructure. Third, burning significantly reduces the volume of material requiring disposal - compared to mechanical recovery. Mechanically -recovered oil must still be transported, stored, and properly disposed. This involves equipment, personnel, time, money, and an approved Resource Conservation and Recovery Act (RCRA) disposal site. Often, these resources are not available in sufficient quantities when large spills occur.

Burning also has disadvantages. The most obvious are the large black smoke plume that is produced by burning oil and concerns about potential associated health effects.
Additionally, oil must be a minimum thickness of 2 to 3 millimeters (mm) to burn efficiently; thin slicks will not burn. This can be partially countered with the use of fire booms to concentrate oils into thicker slicks before burning. However, as oil spreading and dispersion take place over time, the ability to achieve this minimum thickness becomes increasingly difficult.

In-situ burning is considered a trade-off between the ability to remove large amounts of spilled oil from the water surface in a short period of time and the human health effects and ecological impacts of burn by-products. Preliminary data from recent test burns indicate that airborne emissions are not a serious concern at distances greater than a few miles, given the proper atmospheric conditions.

OPERATIONAL LIMITATIONS

1 . FIRE BOOM. The application of *in-situ* burning requires the physical collection and containment of oil to maximize the efficiency of the burning process and to provide a means to control the burn. Generally, this is accomplished by the use of a fire boom or some other type of boom.

2. IGNITION. Heavy oils require longer heating times and a hotter flame to ignite compared to lighter oils. Many ignition sources can supply sufficient heat. These include pyrotechnic igniters, laser ignition systems, and aerial ignition systems. Each have pros and cons to their use. Whichever method is used, considerations of safety and efficiency must enter into the decision process.

3 . OIL THICKNESS. The rule of thumb of *in-situ* burning is that oils can be effectively burned if they are consistently 2 to 3 mm thick.

4. GATHERING. Igniting weathered oil is generally not a problem with most ignition sources because they have sufficient temperature and burn time to ignite most oils. Weathered oil requires a longer ignition time and higher ignition temperatures.

5. EMULSIFICATION. The effect of water content on oil ignition is thought to be similar to that of weathering. It is certain that oil containing some water can be ignited and burned. It is suspected that

burning may break down the water-in-oil emulsion. If a burn can be started, then water content is likely not a problem.

SAFETY CONCERNS

1. FIRE HAZARD. Care must be taken that the burn be controlled at all times to ensure the safety of personnel and property. This precludes burning at sources such as tankers, ships, or tank farms unless means are taken to ensure that the flame cannot propagate from the burn location to the source.

2. IGNITION HAZARD. Personnel and equipment involved in ignition of the oil slick must be well coordinated. Weather and sea conditions need to be kept in mind and adequate safety distances be kept at all times. Specialized ignition equipment, unknown fire behavior and uncertain flask-points introduce safety risks.

3 VESSEL SAFETY. Burning at sea may involve the use of several vessels operating in close proximity, perhaps at night or in conditions of poor visibility. These conditions are hazardous by nature and generally require training and close coordination. Maneuverability while towing boom or positioning other containment equipment will require skilled personnel.

4. TRAINING. Training of personnel to operate equipment for *in-situ* burning should be developed to minimize the risk of injury and accident. Training should meet all applicable OSHA regulations and guidelines. Workers may require respiratory protection and protective clothing, based on risk evaluations by trained site safety or industrial hygiene personnel.

Other hazards can include the exposure of personnel to extreme heat conditions, smoke and fumes; working under time constraints or extended periods of time. Personnel involved with burning operations must be well briefed on the plan of operations, with site safety stressed, and must be notified of all changes from the approved burn plan. The need for burning could be questioned and should be reconsidered if conditions (e.g., weather, operations, equipment) pose a threat or danger to human health and safety, or facilities. This section is not inclusive of all safety concerns. As more knowledge is gained from burning, it is most likely that additional safety concerns will be identified. The site safety plan shall specify worker safety practices and equipment requirements.

HUMAN HEALTH/TOXICITY CONCERNS

Many experts believe that the human health risk from oil fire smoke is relatively small, particularly when compared to health and safety risks associated with mechanical remediation. This assessment, coupled with the likelihood that the lighter fraction of a spill will evaporate unless burned (thereby imposing its own set of health concerns) suggests that the risk is worth considering.

Burning oil produces a visible smoke plume containing smoke particulates, combustion gases, unburned hydrocarbons, residue left at the burn site and other products of combustion. It also results in the evaporation and release of volatile compounds from the oil. Public health concerns relate to the chemical content of the smoke plume and the downwind deposition of particulates. It should be noted that not burning an oil spill also introduces its own air quality concerns. Analysis of the physical behavior of spilled oil has shown that 50 percent of a light crude oil spill can evaporate fairly readily, and it is the acutely-toxic lighter fractions of a crude oil mix that quickly move into the atmosphere.

Results of recent burn tests indicate that burning in situ does not yield significant emissions above that expected for similar types of combustion, such as forest fires. Many human health experts feel that the most significant human health risk resulting from *in-situ* burning is inhalation of the fine particulate material that is a major constituent of the smoke produced. An early assessment of health concerns attributable to the Kuwaiti oil fires identified the less than 10-micron particulate matter as representing the greatest health hazard in that situation. The extent to which these particles present a health risk during an *in-situ* burn depends on the concentration and duration of exposure. It is important to remember that particulates in these concentrations are so small that they do not settle readily. They will be carried by the prevailing wind over large distances, over which their concentrations will rapidly decline.

Polynuclear aromatic hydrocarbons (PAHS) are a group of hydrocarbons produced during *in-situ* burning. They are found in oil and oil smoke, where their relative concentrations in the latter tend to be higher than in the oil itself. Possible carcinogenicity of some members make this group a serious health concern, although it is generally long-term exposure to the higher molecular-weight PAHs that is the basis for concern. Sulfur dioxide (SO2) and nitrogen dioxide (NO2.) are eye-and-respiratory-tract irritants that are produced by oil combustion. Concentration of PAHs decline downwind as smoke from the fire is diluted by clean air. The concentrations of other by-products of burning oil (i.e., combustible gases) also decline downwind.

ECOLOGICAL EFFECTS

Potential ecological impacts resulting from the use of *in-situ* burning have not been extensively studied. Whether *in-situ* burning does result in ecological impacts cannot be directly determined based on existing information. Potential biological impacts are the subject of planned field and laboratory tests.

The surface area affected by burning oil is usually small relative to the total surface area of a given body of water, relative to the total depth of the water body, and is less than the area impacted by the oil slick. This does not preclude adverse ecological effects. The possibility remains that contamination at the sea surface could affect certain unique populations as well as organisms that use surface layers of the water column at certain times to spawn or feed. However, because the distribution of these populations is patchy, these impacts would most likely be localized. The same populations would also be adversely affected to some degree by an oil slick. The plume or heat from the burn will not result in greater impact to populations.

The residual material of an *in-situ* burn is a hydrocarbon compound with little structural change other than the loss of the more volatile groups. It resembles weathered oil of the same source type.

Burn residues could be ingested by fish, birds, mammals, etc. and could be a source of fouling of wildlife; however, it should be noted that the water surface is already adversely affected by oil, and any additional adverse effects from burning would be comparatively small. The extent of these spatial and temporal effects would be expected to be much less severe than those from a large oil spill contained by traditional mechanical methods. The residual material should be removed as soon as possible, and this could be accomplished using traditional spill containment and cleanup equipment and techniques.

Measurements conducted during test burns show that water temperature is not raised significantly, even in shallow confined test tanks. Thermal transfer to the water is limited by the insulating oil layer and is actually the mechanism by which the combustion of oil slicks is extinguished.

Except where conditions of pre-approval are met, the appropriate State and the Federal trustees (e.g., NOAA, DOI) are to be consulted before using *in-situ* burning on oil spills. They can identify resources of concern in the area that could be potentially adversely affected by burning in situ. Interests include but are not limited to:

the proximity of occurrence of the proposed burn in coastal marshes and estuaries and inland marsh/wetland environments;

the occurrence and location of threatened and endangered species in relation to the proposed burn site;

the occurrence and location of sensitive/critical habitat or resources (e.g., land) in relation to the proposed burn site; and

the benefits to sensitive habitats of burning versus the effects resulting from the land fall of oil.

APPENDIX II: IN-SITU BURNING PLAN

THIS CHECKLIST IS PROVIDED AS A SUMMARY OF IMPORTANT INFORMATION TO BE CONSIDERED BY THE UNIFIED COMMAND IN REVIEWING ANY REQUEST TO CONDUCT IN-SITU BURNING IN RESPONSE TO AN OIL SPILL IN THE WATERS OF NORTHERN CALIFORNIA. THIS BURNING PLAN IS DIVIDED INTO SEVERAL SECTIONS OF INFORMATION ABOUT THE SPILL, WEATHER, OIL BEHAVIOR AND PROPOSED BURNING PLAN. IT IS INTENDED THAT THIS BURNING PLAN BE FILLED IN TO HELP THE UNIFIED COMMAND DETERMINE THE FEASIBILITY OF IN-SITU BURNING FOR THE IMMEDIATE SITUATION. THIS BURNING PLAN, IN CONJUNCTION WITH THE MONITORING PLAN, WILL SERVE AS THE POST BURN OPERATIONS REPORT.

SPILL DATA

(RESPONSIBLE PARTY TO COMPLETE AND SUBMIT TO UNIFIED COMMAND)

DATE & TIME OF PLAN

DATE AND TIME OF THE INCIDENT:

LOCATION OF THE INCIDENT:

LATITUDE:

LONGITUDE:

DISTANCE IN MILES AND DIRECTION TO NEAREST LAND:

DISTANCE IN MILES AND DIRECTION TO THE NEAREST POPULATION CENTER(S):

TYPE AND QUANTITY/VOLUME:

RELEASE STATUS:

- ☐ Continuous, at estimated rate of: _____
- ☐ Intermittent, at estimated rate of: _____
- ☐ One time only, flow now stopped. Estimated quantity - bbls: _____

EMULSIFICATION STATUS:

Is product easily emulsified? ☐ YES ☐ NO ☐ UNCERTAIN

Is product emulsified upon release? ☐ YES ☐ NO ☐ UNCERTAIN

IF EMULSIFIED: ☐ LIGHTLY (0-20%) ☐ MODERATE (21-50%) ☐ HEAVILY (>50%) ☐ UNKNOWN

SURFACE AREA OF SPILL (SQUARE MILES) - AS OF DATE/TIME:

IS SOURCE BURNING NOW? YES NO

NATURE OF INCIDENT:

Grounding Transfer Operation Collision Pipeline Explosion

Other: (Describe): _____

VESSEL/FACILITY/PIPELINE INVOLVED:

RESPONSIBLE PARTY:

FEASIBILITY FACTORS:

- ☐ YES ☐ NO Is the oil being considered for In-Situ burning emulsified by less than 60%?
- ☐ YES ☐ NO Is the oil thickness > 1/10 inch?

Revised: 01/01/00
APPENDIX II OF ISB LOA

IN-SITU BURNING PLAN

WEATHER & WATER CONDITIONS

WEATHER: ☐ Sunny ☐ Partly Cloudy ☐ Cloudy ☐ Overcast ☐ Mountain Showers ☐ Offshore Rain Squalls ☐ Heavy Rain

WINDS: Date & Time: _____
Onshore ☐ Knots: _____ Direction: _____
Offshore ☐

SEA STATE: ☐ Calm <1 foot ☐ Choppy 1-3 foot ☐ Swell (in feet) >3 foot

TIDES: (FORECAST)

Low/High	Feet (+/-)	Date & Time
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

SURFACE CURRENTS: Speed / Knots Direction / To

WATER DEPTH: ☐ 10 - 60 feet ☐ 60 - 120 feet ☐ > 120 feet

DAYLIGHT HOURS:

Day / Date	Sunrise	Sunset
_____	_____	_____
_____	_____	_____

WEATHER & WATER 24 HOUR FORECAST

DATE & TIME OF PLAN DEVELOPMENT: _____
FORECASTED WIND SPEED (knots): _____
FORECASTED WIND DIRECTION: _____ ☐ On-Shore ☐ Offshore
FORECASTED SEA STATE: ☐ Calm < 1 foot ☐ Choppy 1 - 3 feet ☐ Swell (in feet) >3 feet

ESTIMATED SMOKE TRAJECTORY

Describe expected smoke plume trajectory: _____
Is plume expected to impact concentrated human or wildlife populations? ☐ YES ☐ NO

FEASIBILITY FACTORS:

☐ YES	☐ NO	Is the wind speed < 25 knots?
☐ YES	☐ NO	Is wave height < 2 - 3 feet?
☐ YES	☐ NO	Is visibility > 500 feet vertically and ½ mile horizontally?
☐ YES	☐ NO	Are rain forecasts favorable for ignition?

IN-SITU BURNING PLAN APPX II OF ISB LOA

A. Location of proposed burn relative to the spill source:

B. Location of proposed burn relative to nearest uncontrolled ignitable slick(s):

C. Location of proposed burn relative to nearest sizeable downwind human population:

D. Location of proposed burn relative to nearest downwind concentrated wildlife population:

E Potential for reducing visibility at nearby airport(s) or freeway(s):

F. Will radio notification of human populations be required? ☐ YES ☐ NO

G. Proposed ignition method:

Will burn promoters be used? ☐ YES ☐ NO
Will de-emulsifiers be used? ☐ YES ☐ NO

H. Methods proposed for controlling the burn:

Will fire boom be used? ☐ YES ☐ NO

IN-SITU BURNING PLAN APPX II OF ISB LOA

I. PROPOSED BURNING STRATEGY

- ☐ Controlled burning in fire boom under tow.
- ☐ Controlled burning of static oil contained within fire boom.
- ☐ Complete burning of a derelict or hazardous vessel.
- ☐ Controlled burning of static oil contained in a natural collection site at or near shore.
- ☐ Disposal of oiled debris by controlled burning in remote areas.

OTHER:

J. Estimated amount of oil to be burned:

K. Estimated duration of Burn Operations: (hours)

L. Method of collecting burned residue:

M. Proposed storage and disposal of burned oil residue:

FEASIBILITY FACTORS

☐ yes	☐ no	Can ignition and a complete burn occur at a safe distance from other response operations and public, recreational and commercial activites?
☐ yes	☐ no	Is the smoke plume unlikely to impact areas of concentrated human or wildlife populations?
☐ yes	☐ no	Are adequate fire boom, tow boats and igniter resources available?
☐ yes	☐ no	Are adequate notice to be given to mariners, aircraft pilots and the general public?
☐ yes	☐ no	Can necessary personnel and equipment be mobilized during the in-situ burning window of opportunity?

IN-SITU BURNING PLAN APPX II OF ISB LOA

PLAN NUMBER: _____

DATE: _____

OPERATIONAL PERIOD: _____

TO: _____

FEDERAL OSC

☐ **APPROVED** ☐ **NOT APPROVED**

_____

SIGNATURE

Typed Name & Title:

COMMENTS:

IN-SITU BURNING MONITORING PLAN

THE PRIMARY OPERATIONAL PURPOSE IN MONITORING IN-SITU BURNING OF SPILED OIL IS TO DETERMINE IF BURNING REQUIREMENTS AND OBJECTIVES ARE MET. SINCE THE CURRENT BODY OF KNOWLEDGE ABOUT BURNING IS SMALL, EACH OPERATIONAL USE PROVIDES AN OPPORTUNITY TO GATHER DATA. THE RRT WILL BE ABLE TO USE THIS DATA TO REFINE AFTER EACH SPILL RESPONSE USING IN-SITU BURNING. THESE LESSONS WILL BE INCORPORATED INTO THE IN-SITU PLAN SUBMITTED TO THE FOSC.

IT IS INTENDED THAT THIS MONITORING PLAN FORM SHOULD BE COMPLETED AFTER EVERY IN-SITU BURN EPISODE. THERE IS A FORM FOR THE BURN SUPERVISORS AND ANOTHER FORM FOR THE CASUALLY TRAINED OBSERVERS TO COMPLETE. THE ACCUMULATED DATA IS TO BE SUBMITTED TOGETHER WITH THE IN-SITU BURN PLAN TO FORM THE POST BURN OPERATIONS REPORT.

BURN SUPERVISOR REPORT FORM

_____ _____
NAME OF BURN SUPERVISOR ORGANIZATION

_____ _____
NAME OF BURN EPISODE (IE: BURN 1, BURN 2) DATE AND TIME OF REPORT

HAS A SAMPLE OF THE OIL TO BE BURNED BEEN COLLECTED: YES NO
(ONLY ONE SAMPLE PRIOR TO THE FIRST BURN DURING AN OPERATIONAL PERIOD IS REQUIRED)

METHOD OF IGNITION:

TIME AT START OF BURN:_____ **TIME AT END OF BURN: _____**

WIND SPEED DURING BURN: _____

WIND DIRECTION DURING BURN:

WAS SMOKE PLUME TRAJECTORY SATISFACTORY TO AVOID CONCENTRATED AREAS OF HUMAN OR WILDLIFE POPULATIONS? YES NO

DESCRIBE THE SMOKE PLUME: (Height above water, distance, direction, dispersion, etc.)

OBSERVATION OF EFFECTIVENESS OF THE BURN:

OBSERVATION OF EFFECTIVENESS OF RESIDUAL MATERIAL COLLECTION:

IN-SITU BURNING MONITORING PLAN

IT IS INTENDED THAT THIS OBSERVER'S MONITORING REPORT BE FILLED OUT BY THOSE INDIVIDUALS WHO MAY NOT BE EXPERTS AT IN-SITU BURNING, BUT ARE IN A POSITION TO OBSERVE THE BURN AND WITNESS ITS EFFECTS.

OBSERVERS MONTITORING REPORT

_____ _____
NAME OF OBSERVER DATE AND TIME

_____ _____
NAME OF BURN EPISODE (IE: BURN 1, BURN 2) ORGANIZATION

WAS SMOKE PLUME TRAJECTORY SATISFACTORY TO AVOID CONCENTRATED AREAS OF HUMAN OR WILDLIFE POPULATIONS? YES NO

COMMENTS:

GENERAL OBSERVATIONS:

IN-SITU BURN SITE SAFETY AND HEALTH PLAN

RESPONSIBLE PARTY:

PLAN NO. : _____
(OPTIONAL)

INCIDENT FACTS

NAME: _____
LOCATION:
DATE: TIME:

OPERATIONAL PERIOD

FROM:_____ DATE:_____ TIME:_____
TO: _____ DATE: _____ TIME:_____
STATUS: NEW ☐ REVISED ☐

CHAIN OF COMMAND

DIVISION: GROUP:

ON SCENE COMMANDER / BURN SUPERVISOR

NAME	COMPANY/ORGANIZATION	PHONE/RADIO	OPERATIONAL AREA

SITE SAFETY OFFICER

NAME	COMPANY/ORGANIZATION	PHONE/RADIO	OPERATIONAL AREA

ON-VESSEL SAFETY SUPERVISORS

NAME	COMPANY/ORGANIZATION	PHONE/RADIO	OPERATIONAL AREA

SITE OPERATING COMPANIES

COMPANY NAME / ADDRESS:

VESSEL CAPTAIN	PHONE/RADIO	NAME OF VESSEL

HEALTH & PPE REQUIREMENTS (SEE MATRIX)

*Outer Gloves	*Face Shield	*Site Characterization	*Pre-work Medical	*Zone Control
*Inner Gloves	*Sun Hat	*Air Purifying Resp.	*40 Hr. HAZWOPER	*Security
*Rubber Boots	*Sun Tan Lotion	*Supplied Air Resp.	*24 Hr. HAZWOPER	*E/S Ent. Permit
*2/3 Body Cover	*Taped Leg Joints	*Safety Glasses	*First Aid Station	*Personnel Dept.
*Full Body Cover	*Hard Hat	*Heat Stress Program	*Shade Station	*USCG Life Vests

IN-SITU BURN SITE SAFETY AND HEALTH PLAN

DESCRIPTION OF SITE

LOCATION OF SITE: _____
(Latitude / Longitude) Latitude: _____ Longitude: _____

DESCRIPTION OF SITE: _____
_____

DESCRIPTION OF SURROUNDING AREA: _____
_____

DESCRIPTION OF SURROUNDING POPULATION: _____
_____

COMMUNICATIONS MATRIX

ROUTINE COMMUNICTIONS:

COMMAND VESSEL WILL PROVIDE GENERAL COMMAND FUNCTIONS FOR BURN OPERATIONS, AND IT WILL SERVE AS THE PRIMARY COMMUNICATIONS POST. ALL RADIO FREQUENCIES WILL BE CONTINUOUSLY MONITORED BY COMMAND. PERSONNEL ABOARD THE COMMAND VESSEL, AND SAFETY PERSONNEL.

EMERGENCY COMMUNICATIONS:

AN EMERGENCY CAN BE COMMUNICATED OR DECLARED USING ANY ASSIGNED COMMUNICATIONS METHOD. ALL WORKING FREQUENCIES WILL BE MONITORED THROUGHOUT THE RESPONSE EFFORT BY THE COMMAND AND SAFETY VESSEL(S).

CONTACT LIST:

FUNCTION & NAME	PHONE NUMBER	RADIO CONTACT
OSC:		
SOSC:		
BURN SUPERVISOR:		
SITE SAFETY OFFICER:		
COMMS OFFICER:		
SSC:		
TRUSTEES:		
TRUSTEES:		

IN-SITU BURN SITE SAFETY AND HEALTH PLAN

VESSEL LIST

NAME POSITION	VESSEL NAME	PHONE	RADIO

COMMUNICATIONS METHODS

COMMAND & CONTROL:

PRIMARY METHOD OF COMMUNICATIONS FOR THE COMMAND AND TRUSTEES GROUP IS ASSIGNED CELL PHONES. THE BURN SUPERVISOR AND COMMUNICATIONS POST SHALL ALSO HAVE CELL PHONE.

BURN & VESSEL OPS:

PRIMARY METHOD OF COMMUNICATIONS WILL BE ASSIGNED MARINE VHF CHANNEL/FREQUENCIES

- AVIATION COMMUNICATIONS BETWEEN VESSEL AND AIRCRAFT WILL BE ON MARINE CHANNEL 18A, WHICH IS 156.900 MHz.

- THE WORKING MARINE VHF CHANNEL FOR THE LEAD BOAT AND THE SECOND BOOM TOWING VESSEL SHALL BE DETERMINED PRIOR TO OPERATIONS. IN ADDITION, ALL VESSELS SHALL MONITOR MARINE VHF CHANNEL 6 THE SPILL RESPONSE DESIGNATED HAILING CHANNEL.

IN THE EVENT OF COMMUNICATIONS EQUIPMENT FAILURE:

1. A WHISTLE WILL BE USED TO INDICATE A NEED FOR ASSISTANCE.

2. THREE (3) SHORT REPEATED-BLASTS FROM VESSEL HORN SHALL INDICATE AN EMERGENCY.

GO / NO - GO POLICY

- EACH VESSEL COMMANDER (CDR), OPERATIONAL CDR, OR TRUSTEE CAN STOP THE COMMENCEMENT OR CONTINUATION OF THE BURN BASED ON THE SAFETY CONCERNS WITHIN EACH AREA OF RESPONSIBILITY.

- IMMEDIATELY PRIOR TO IGNITING THE BURN, THE FOLLOWING PERSONNEL SHALL BE POLLED TO DETERMINE GO/NO-GO STATUS. THE OSC, SOCS, BURN SUPERVISOR, SITE SAFETY OFFICER AND PARTICIPATING TRUSTEES.

- ANY OF THESE IDENTIFIED PERSONNEL MAY REQUEST TERMINATION OF THE BURN FROM THE OSC SHOULD CONDITIONS REQUIRED FOR THE BURN CHANGE AND ARE NO LONGER MET.

APPENDIX IV OF ISB LOA

IN-SITU BURN SITE SAFETY AND HEALTH PLAN

PERSONNEL RESPONSIBILITIES

BURN SUPERVISOR

- REPORTS DIRECTLY TO THE OSC.

- IS RESPONSIBLE FOR THE OVERALL BURN OPERATION, INCLUDING BUT NOT LIMITED TO: IGNITION AND TERMINATION, PRE-IGNITION CHECKLIST, GO/NO-GO POLLING OF DESIGNATED PERSONNEL, SAMPLE TAKING AND RECORD KEEPING.

- IS THE DESIGNATED BOOM COMMANDER.

SITE SAFETY OFFICER

- REPORTS DIRECTLY TO THE BURN SUPERVISOR

- IN CHARGE WITH THE OVERALL RESPONSIBILITY OF ENSURING WORKER HEALTH AND SAFETY DURING BURN OPERATIONS.

- CONDUCTS PREBURN SAFETY BRIEFING ON OPERATIONAL PROCEDURES AND GOALS.

- IDENTIFIES POTENTIAL EMERGENCIES.

- COORDINATES IMPLEMENTATION OF THIS PLAN.

- ASSIGNS AND MONITORS ALL ASSOCIATED SAFETY PERSONNEL.

VESSEL RESPONSIBILITIES

COMMAND VESSEL

- SHALL SERVE AS THE ON-SITE COMMAND AND COMMUNICATIONS POST.

- BURN SUPERVISOR AND OSC SHALL CONDUCT BURN OPERATIONS FROM THIS VESSEL COMMAND POST.

- SHALL BE APPROPRIATE IN SIZE AND MANNING TO SERVE AS OPERATIONS COMMUNICATIONS AND COMMAND PLATFORM.

- SHALL SERVE AS THE LEAD BOOM TOWING VESSEL.

SAFETY BOAT

- MONITORING AND MAINTAINING FIRE FREE ZONES

- TASKED WITH FIRE WATCH AND MAINTAINING A LIMITED FIRE FIGHTING CAPABILITY.

- ASSISTS WITH BURN OBSERVATION AND EFFECTIVENESS MONITORING.

- TASKED WITH DEBRIS RECOVERY.

APPENDIX IV OF ISB LOA

IN-SITU BURN SITE SAFETY AND HEALTH PLAN

OPERATIONAL OBJECTIVES

1 OPERATE IN COORDINATION WITH THE COMBINED ICS TO COORDINATE BURNING ACTIVITIES WITH ALL OTHER OFFSHORE/NEARSHORE RESPONSE OPERATIONS.

2. PERFORM ON-WATER IN-SITU BURNING OPERATIONS IN ACCORDANCE WITH THE IN-SITU BURNING PLAN.

3. ON-WATER FLOTILLA IS TO AVOID THE SMOKE PLUME DURING IN-SITU BURNING OPERATIONS.

SITE CONTROL

- SITE CONTROL DISCRIPTION: THE MAIN WORK DECK OF THE VESSELS IS THE EXCLUSION ZONE DURING ACTIVE OIL SPILL OPERATIONS. THE OTHER SECTIONS AND DECKS OF THE VESSEL ARE SUPPORT AREAS.
  SITE CONTROL MAP: SEE ATTACHMENT 1

SITE SECURITY

- THE CAPTAIN OF THE VESSEL IS RESPONSIBLE FOR VESSEL SECURITY.

  ON WATER BURN ZONE SECURITY WILL BE IMPOSED AND CONTROLLED BY THE U.S. COAST GUARD

SITE CHARACTERIZATION AND MONITORING

EXPOSURE POTENTIAL:

- ZONE CONTROL WILL BE ESTABLISHED PRIOR TO ENTERING A RESPONSE AREA DEPENDING ON THE SPILL EXPOSURE POTENTIALS INCLUDING: TBX (BENZENE), H2S (HYDROGEN SULFIDE) AND LEL (LOWER EXPLOSIVE LIMIT)

- NO ENTRY INTO AN EXCESSIVE TBX (BENZENE), H2S (HYDROGEN SULFIDE)

- ENTRY INTO AN EXCESSIVE BENZENE ENVIRONMENT MAY BE CONSIDERED FOR SPECIAL PURPOSES IN COMPLIANCE WITH APR/SAR REGULATIONS

- DURING IN-SITU BURN ACTIVITIES, ALL PERSONNEL WILL HAVE APR'S AVAILABLE.

REQUIRED CHARACTERIZATION TESTING:

- TBX (TEST FOR BENZENE), H2S AND LEL TESTING ARE MINIMUM REQUIREMENTS

- SEE PAGE 3 FOR FIELD CHARACTERIZATION CHECKLIST

EXPOSURE LIMITS:

BENZENE: NIOSH HAS IDENTIFIED BENZENE AS AN OCCUPATIONAL CARCINOGEN. EXPOSURES SHOULD BE LIMITED TO THE LOWEST FEASIBLE CONCENTRATION.

H_2S: OSHA PEL - 10 ppm, IDLH - 300 ppm

O_2: 10%

0_2: >19.5% <21.5%

PEL = PERMISSIBLE EXPOSURE LIMIT

STEL = SHORT TERM EXPOSURE LIMIT

IDLH = IMMEDIATELY DANGEROUS TO LIFE AND HEALTH

REQUIRED MONITORING:

AFTER SITE CHARACTERIZATION, BENZENE, H2S AND LEL WILL BE MEASURED ONCE PER HOUR UNLESS:

1) ANY MEASUREMENT REFLECTS A REASONABLE POSSIBLE POSSIBLITY THAT AN STEL WILL BE REACHED. AT THIS TIME, CONTINUOUS MONITORING WILL TAKE EFFECT

2) THE SITE SAFETY OFFICER AND ON SCENE COMMANDER DECIDE THAT MONITORING INTERVALS SHOULD BE ALTERED BASED ON THEIR JUDGEMENT FROM PRIOR READINGS AND CONTINUOUS JOB SITE ASSESSMENT..

IN-SITU BURN SITE SAFETY AND HEALTH PLAN

EMERGENCY PROCEDURES

EMERGENCY FIRE PROCEDURE

A FIRE EMERGENCY SHALL INCLUDE ANY NON CONTROLLED BURNING WITHIN THE BURN OPERATION AREA.

- THE SITE SAFETY OFFICER OR OTHER QUALIFIED INDIVIDUAL MUST:
  1) TAKE CHARGE OF THE SITUATION.
  2) NOTIFY BURN SUPERVISOR OF THE EMERGENCY.
  3) NOTIFY FIRE DEPARTMENT AND SAFETY BOAT OF TYPE OF ASSISTANCE NEEDED.
  4) SOUND APPROPRIATE FIRE SIGNAL. (THREE (3) BLASTS OF A HORN).
- THE BURN SUPERVISOR WILL ENSURE THAT THE FIRE IS EXTINGUISHED PRIOR TO RESTARTING BURN OPERATIONS.

EMERGENCY TERMINATION OF BURN

- IN THE EVENT THAT THE FUNDAMENTAL SAFETY CONDITIONS CHANGE OR AN EMERGENCY SITUATION ARISES AFTER INITION OF THE BURN, THE FOLLOWING METH0DS MAY BE USED TO TERMINATE THE BURN:
  1) RELEASING THE TOW LINE FROM ONE OF THE TOW VESSELS WHILE THE OTHER TOW VESSEL MOVES AHEAD AT SEVERAL KNOTS.
  2) MOVE BOTH VESSELS AHEAD AT SEVERAL KNOTS FORCING THE OIL BENEATH THE BOOM AND REMOVING IT FROM THE COMBUSTION ZONE.
  .
- ALTHOUGH THE OSC HAS OVERALL BURN TERMINATION AUTHORITY, ANY DESIGNATED SAFETY SUBERVISOR MAY REQUEST THE BURN BE TERMINATED.

EMERGENCY MEDICAL PROCEDURES

- WHEN A PERSON IS INJURED, THE SITE SAFETY OFFICER OR OTHER QUALIFIED PERSONNEL MUST:
  1) TAKE CHARGE OF THE SITUATION
  2) PROVIDE NECESSARY DECONTAMINATION
  3) ADMINISTER FIRST AID
  4) ARRANGE FOR ADDITIONAL MEDICAL ASSISTANCE AS NECESSARY
  5) IF A SERIOUS INJURY OR LIFE THREATENING CONDITION EXISTS, NOTIFY THE USCG OPERATIONS CENTER AT MSO SAN FRANCISCO BAY **(510) 437-3073**
     MSO LOS ANGELES/LONG BCH **(562) 980-4444** OR
     MSO SAN DIEGO **(619) 683-6470**

APPENDIX IV OF ISB LOA

IN-SITU BURN SITE SAFETY AND HEALTH PLAN

STANDARD PROCEDURES FOR REPORTING EMERGENCIES

WHEN CALLING FOR ASSISTANCE IN AN EMERGENCY, PROVIDE THE FOLLOWING INFORMATION:

- YOUR NAME
- LOCATION
- TELEPHONE NUMBER AT YOUR LOCATION
- NAME OF PERSON(S) EXPOSED OR INJURED
- ACTIONS ALREADY TAKEN

EMERGENCY RESPONSE RESOURCES

AMBULANCE

IN AN OFFSHORE EMERGENCY, EITHER A LOCAL WATER TAXI COMPANY OR THE U.S. COAST GUARD SEARCH AND RESCUE CENTER WILL PROVIDE TRANSPORTATION TO THE NEAREST AMBULANCE/MEDICAL FACILITY. DUE TO THE TRANSIENT NATURE OF THIS OPERATION. THE SITE SAFETY OFFICER WILL CONTINUOUSLY RESEARCH AND LOCATE THE NEAREST AMBULANCE SERVICE BASED ON PRESENT LOCATION.

FIRE DEPARTMENT

DEPENDING ON THE SITE LOCATION, **DIALING 911** MAY SUFFICE FOR FIRE DEPARTMENT CONTACT.
A FIRE BOAT WILL RESPOND INSIDE OF AND UP TO _____ OUTSIDE OF _____.
IF THE EMERGENCY IS OUTSIDE OF THIS AREA, CALL THE U.S. COAST GUARD AT
(_____)_____-_____

OIL SPILL RESPONSE

FOR ADDITIONAL RESPONSE ASSISTANCE, CALL:

HOSPITAL/EMERGENCY MEDICAL

SINCE ON-WATER OIL SPILL OPERATIONS ARE TRANSIENT, THE SITE SAFETY OFFICER WILL CONTINUOUSLY RESEARCH AND LOCATE THE NEAREST HOSPITAL/EMERGENCY MEDICAL FACILITIES BASED ON PRESENT LOCATION. _____BURN CENTER IS THE BEST LOCATION IN NORTHERN CALIFORNIA FOR BURNS

EMERGENCY PHONE NUMBERS

U. S. COAST GUARD		LOCAL FIRE DEPARTMENT	
LOCAL POLICE DEPARTMENT		POISON CONTROL CENTER	
STATE OF CALIFORNIA OFFICE OF EMERGENCY SERVICES	(800)852-7550	NATIONAL SPILL RESPONSE 24 HR. REPORT HOTLINE	(800) 424-8802
USCG SEARCH AND RESCUE		CHEMTREC (24 HOUR)	(800) 424-9300

IN-SITU BURN SITE SAFETY AND HEALTH PLAN

THERMAL STRESS REDUCTION PROGRAM

OPERATIONAL REQUIREMENTS

TO REDUCE THE EFFECTS OF HEAT STRESS, 2/3 SLICKER BOTTOMS ARE A STANDARD REQUIREMENT. UPPER TORSO EXPOSURE IS MINIMAL DURING NORMAL OPERATIONS. DURING OVERHEAD OPERATIONS WITH DRAPING OIL OR WHEN SPLASHING OCCURS FULL PPE WILL BE WORN

TO FURTHER REDUCE THE POSSIBILITIES OF HEAT STRESS, SUN SHADE HATS IS MANDATED ON THE VESSEL'S WORK DECK DURING LIFTING OPERATIONS. HOWEVER, THE WEARING OF HARD HATS IS MANDATED ON THE VESSEL'S WORK DECK DURING LIFTING OPERATIONS.

- HAZWOPER COLORS WILL BE ENFORCED FOR ALL HATS:
  - -GREEN HAT = 24 - 48 HOURS
  - -YELLOW HAT = 4 - 23 HOURS
  - -WHITE HAT = NO HAZWOPER TRAINING OR NOT CURRENT WITH APPLICABLE REFRESHERS

- ABOVE 85 DEGREES (F) EITHER COOLING VESTS OR TIME LIMITATIONS WILL BE IMPLEMENTED TO REDUCE HEAT STRESS.

HAZARD REDUCTION PROCEDURES

PRIOR TO THE VESSEL DISPATCHING FROM THE PIER, THE SHIP'S CAPTAIN (OR DESIGNATE) WILL GIVE ON-BOARD PERSONNEL A PREDEPARTURE SAFETY BRIEFING CONCERNING THE VESSEL.

PRIOR TO BEGINNING ANY ON-SITE IN-SITU BURNING WORK, THE SITE SAFETY OFFICER WILL GIVE A SITE & JOB SPECIFIC SAFETY BRIEFING TO ALL WORKERS ON BOARD THE VESSEL.

NOTIFICATION AND DISTRIBUTION

UNITED STATES COAST GUARD
MSO SAN FRANCISCO BAY
BLDG 14 COAST GUARD ISLAND
ALAMEDA, CA 94501-5100
510-437-3073

PLAN APPROVALS

RESPONSIBLE PARTY: _____
(Signature) (Date)

UNITED STATES COAST GUARD:

_____
(Signature) (Date)

STATE OF CALIFORNIA DEPT. OF HEALTH:

_____
(Signature) (Date)

PLAN PREPARER:

_____
(Signature) (Date)

IN-SITU BURN SITE SAFETY AND HEALTH PLAN
FIELD SITE CHARACTERIZATION CHECKLIST

DATE: **TIME:**

LOCATION:

TYPE OF PETROLEUM INVOLVED:

SPECIAL IN-SITU BURNING CONSIDERATIONS:

THE OBJECTIVE IS TO AVOID THE SMOKE BY-PRODUCTS OF IN-SITU BURNING. KEEP VESSELS AND PERSONNEL UPWIND OF THE SMOKE PLUME. THIS IS ALSO THE BASIC PRECAUTION REQUIRED FOR EMITTED GASES. STUDIES SHOW THAT THE DANGER FROM GASES EMITTED DURING IN-SITU BURNING REMAIN SIGNIFICANTLY BELOW EXPOSURE UNITS. SUCH EMISSIONS CAN INCLUDE SULFUR DIOXIDE (SO2) (PEL = 0.2 ppm), NITROGEN DIOXIDE (NO2) (PEL = 0.1ppm), AND CARBON MONOXIDE (CO) (PEL = 35ppm). IT IS INTENDED THAT BY AVOIDING THE SMOKE THESE POSSIBLE EMISSIONS WILL NOT BE A PROBLEM.

PERSONAL PROTECTIVE EQUIPMENT:

DURING ACTIVE IN-SITU BURNING OPERATIONS APR'S SUITABLE FOR BOTH ORGANIC VAPORS AND PARTICULATES SHALL BE WORN BY ALL PERSONS ON VESSELS IN PROXIMITY TO THE SMOKE

☐	Outer Gloves	☐	Face Shield	☐	Rubber Boots	☐	Taped glove gauntlets
☐	Inner Gloves	☐	Hard Hat	☐	Taped Leg Joints	☐	USCG PFD
☐	2/3 Body Cover	☐	Sun Hat	☐	Air Purifying Resp.	☐	Safety Glasses
☐	Full Body Cover	☐	Sun Tan Lotion	☐	Supplied Air Resp.	☐	Benzene Monitors

MONITORING EQUIPMENT

Industrial Scientific Model MX 251 Gas Detector for LEL and O
AIM Model 3350 Gas Detector for H_2S
PHOTOBAC "SNAP SHOT" PORTABLE GAS CHROMATOGRAPH for Benzene

LEL EXPLOSIVE VAPORS

USING THE MX 251, MEASURE THE LOWER EXPLOSIVE LIMITS.
READING MUST BE LESS THAN 10%

LEL = _____

H_2S -HYDROGEN SULFIDE:

USING THE AIM GAS DETECTOR, MEASURE THE CONCENTRATION OF H2S.

H_2S = _____

BENZENE (TBX)

USING THE "SNAP SHOT" GC, MEASURE OF THE CONCENTRATION OF BENZENE. READING MUST BE LESS THAN 1 ppm.

BENZENE = _____

IN-SITU BURN BOOM OPERATIONS PROCEDURES

PRE-IGNITION CHECKLIST

COMMUNICATIONS OFFICER WILL:

- ☐ Perform radio check with each vessel and participating trustee.
- ☐ Verify each vessel is aware of burn trajectory and time of ignition.

BURN SUPERVISOR WILL:

- ☐ Verify clear burn path from aircraft.
- ☐ Ensure boats and booms are pointed upwind.
- ☐ Designate oil-free safe area for vessels in case of emergency.
- ☐ Obtain final burn approval from FOSC.

BOOM TOWING SAFETY INSTRUCTIONS

1. Contained oil should be ignited only after the requirements for Tab d to Annex X of the In-Situ Burn L.O.A. and pre-ignition and operational checklist are met, and confirmed by all key participants via radio link.

2. All vessels must remain at least (5) fire diameters from the flame perimeter.

3. When using six hundred and sixty feet (660 ft.) or less of boom, use tow lines equal to the length of the boom. For boom longer than six hundred and sixty feet, tow lines may be less than the length of the boom.

4. Prior to ignition, ensure that all personnel on-site are positioned upwind or cross-wind from the target slick.

Prior to ignition, ensure that all personnel on-site are positioned upwind or cross-wind from the target slick.

FIRE CONTROL

BURN SUPERVISOR WILL BE POSITIONED ON THE COMMAND VESSEL.
HE/SHE WILL:

- ☐ Control the burn rate by coordinating boom towing vessels' forward velocity. (Burn rate is dependent upon oil layer thickness)

IN-SITU BURN BOOM OPERATIONS PROCEDURES

BURN EFFECTIVENESS MONITORING
SITE SAFETY OFFICER WILL BE POSITIONED ABOARD A DEDICATED SAFETY VESSEL. HE WILL:

- ☐ Assist the command vessel with monitoring the burn's effectiveness
- ☐ Monitor the status of the burn in relation to the proximity of the burn to towing vessels and other response vessels.
- ☐ Monitor and maintain pre-designated "fire-free" zones between response vessels or between the burn and specified sensitive areas.
- ☐ Provide backup support for deployment and containment operations.
- ☐ Provide extra personnel and equipment, where needed.

TERMINATION OF BURN AND EMERGENCY TERMINATION OF BURN

In most circumstances, the FOSC should plan to allow an oil slick to burn to completion once it has ignited. However, premature termination of a burn may be necessary if the wind or weather shifts unexpectedly, or if secondary ignition of another slick is a possibility.

As part of the **GO/NO-GO POLICY**, the Burn Supervisor, Site Safety Officer, participating Trustees or designated safety personnel may stop the response effort by declaring an emergency.
If an emergency is declared, the person declaring the emergency will:

- ☐ Provide description of the problem to the Burn Supervisor and FOSC.

FOSC will determine the course of action.
If the burn is terminated, Burn Supervisor will:

PRIMARY METHOD

- ☐ Order one of the towing vessels to release the tow line from the vessel
- ☐ Order the other towing vessel to move ahead at several knots. (Oil will spread Out quickly to a thickness that cannot support combustion.)

SECONDARY METHOD

- ☐ Order both vessels to move ahead at several knots. (Oil will be forced beneath the boom, removing it from the combustion zone.)

APPENDIX – VI OF ISB LOA

RESOLUTION OF QUESTIONS RE ISB LOA
RRT, REGION IX-MAINLAND

This information was agreed upon in an RRT Meeting in Novato, CA October 30-31, 1996; and the details are to accompany the LOA.

(1) Geographical Boundaries (Page Two of the LOA). Designation of area covered by the Letter of Agreement: 35-200 nautical miles from the Mainland Coast of California. This does not mean 35 nm from the shoreline of islands. It will be up to the FOSC to determine whether there is any unprotected human population on an island which may be within this zone. If there were to be such a person (s), then monitoring would need to be done to assure that the limits were not exceeded.

(2) There have been no specific comments from NOAA or DOD regarding any additional specifics for land within their jurisdictions. It will be assumed that for any geographical entity within the zone covered by the LOA, the judgment of the FOSC and the restrictions itemized in the LOA will be sufficient protection for these geographical entities.

(3) Appendices II-V are still given as examples of the type of document which should be developed if an in situ burn were to be done. The RRT signatory agencies do not expect to see such a document in advance of the burn, but they do expect that the pertinent information would be developed, that the FOSC or his designee would review it, and that the FOSC report would contain all the pertinent information.

(4) A statement will be added to the LOA that it will be reviewed annually and updated as appropriate.

(5) Specific comments were received from the US Coast Guard-Strike Force Coordination Center (marked "*"). RRT response follows (marked "**").

* 1. "Guidelines paragraph 2 note conditions that allow the FOSC to conduct a burn without concurrence from other Federal officials, yet this appears to be contradicted by the go/no-go discussion in Appendix IV."
**Appendix IV is an example of a Site Safety Plan. It is assumed that the FOSC will approve all aspects of the operation of the ISB. The go/no-go decision would be up to the FOSC and the details of an approved ISB operation would be the subject of an aftermath report (the FOSC Report), which will be made available to the RRT.

*2. "Guidelines paragraph 4 indicate wind patterns will be predicted by the NOAA SSC. The National Weather Service or military weather personnel may also be useful and provide added flexibility in this ... regard. "
**True. The NOAA SSC works for the FOSC and gathers necessary information from a number of sources. These are useful suggestions.

*3. "Guidelines paragraph 5 indicates the existence of protocol for observing and halting the burn in Appendix III, however Appendix III ... does not have sufficient monitoring detail and does not appear to be based on the Special Response Operations Monitoring Program. The monitoring paragraph of the Documentation, Monitoring and Evaluation Section also refers to Appendix III for monitoring details that are not there. Also, in one of these sections there should be some clarification as to who is monitoring for what. The USCG may be doing effectiveness monitoring and others may be interested in effects monitoring."
**True. The entire operation is under the purview of the FOSC. Individual monitoring activities, pertinent to the specific ISB situation would be described in the Monitoring Plan, which would be drawn up specifically for the ISB being undertaken. Appendix III in this LOA is an example developed by Oceania RRT participants. The case-specific information and Plans would be available after the ISB, for RRT review in the FOSC Report.

*4. "Guidelines paragraph 8 should be more specific as to what are trained professionals and recognized techniques/technologies."

**This is left initially to the judgment of the FOSC. The RRT can review the specifics in the FOSC Report and determine whether more clarification should be given in advance. If the decision were to give more clarification, then this guidance would be part of the update of the LOA.

*5. "Guidelines paragraph 9 should be more specific as to what is necessary for rapid controlling and stopping of the burn."
**This is left initially to the judgment of the FOSC.

*6. "Appendix I, Overview, Safety Concerns, Vessel Safety Section should address the use of safety zones and broadcast notice to mariners as a means to increase overall vessel safety
**These operational concerns are left up to the FOSC.

*7. "Appendix I, Overview, Safety Concerns, the entire section should be cross-checked against the hazards listed in Appendix IV to ensure all are appropriately discussed (e.g. H2S discussed in Appendix IV but not in Appendix I; Polynuclear Aromatic Hydrocarbons discussed in Appendix I but not in Appendix IV)."
**Human Health & Toxicity Concerns Section of Appendix I contains some general language which includes these noted compounds - "chemical content of the smoke plume is one reference, and "sulfur dioxide ... produced by oil combustion" is another. Appendix I is meant as a broad overview of the risks and the tradeoffs; specific details are found in the Safety and Monitoring Appendices which would.be developed in a specific ISB application, conducted under the overview of the FOSC.

*8 " Appendix II, In-situ Burning Plan, the following details should be added: (1) People and equipment resources to conduct the burn; (2) Command and control issues; (3) Communications; (4) Backup mechanical containment and recovery measures."
**These operational details would be developed in a case-specific plan for the ISB actions which the FOSC overviews.

*9. Appendix II, recommend "Weather & Water 24 Hour Forecast" section be reworded to
"Marine Weather 24 Hour Forecast."
**OK - since Appendix II is an example, the changed language can be part of the example.

*10. "Appendix II, "Estimated Smoke Trajectory: With all the computer models capable of predicting plume behavior available, recommend one or more be used and referenced in the Plan."
**OK - this would be up to the FOSC, and the NOAA SSC would most likely be using these as part of the NOAA-provided support.

*11. "Appendix IV appears to be a good, comprehensive site safety and health plan that has significantly more detail than the Burning Plan and the Burn Monitoring Plan. Normally these two plans would generate the concerns that drive the site safety plan. Recommend that the site safety plan be used to work backwards and flesh out the Burning and Burn Monitoring Plans. Recommend the drafters of this document contact the NRT S&T subcommittee to achieve standardization and common benefit from these two development efforts."
**Noted. These appendices are examples only.

*12. A number of specific comments were made by the USCG reviewer on improvements to the Site Safety and Health Plan. These are listed without comment, since this Appendix is given as an example of a site safety plan, which would be developed for each specific ISB application.
(1) Use term "personal Flotation Device: in lieu of "USCG Life Vest" in PPE Requirements section;
(2) Add OSHA PEL (TWA) for Benzene (1 ppm) in Exposure Limits section;
(3) List/explain PAH hazards in Exposure Potential section (as mentioned in Appendix I Overview);
(4) Use term "explosive/flammable gases" vs "LEL" as the Exposure Potential (since LEL is the exposure limit for those hazards);
(5) Exposure Limit for "explosive/flammable" gases should be written as "less than 10% of the LEL";
(6) Add "reading must be less than 10 ppm" under H2S monitoring section;

(7) Plan Approvals Section, wrong use of "IT'S", delete word, and add "representative: following the agency (not under the blank itself), recommend use the term "Federal On-Scene Coordinator (FOSC)" here (as mentioned in Purpose section of LOA);
(8) What does "E/S Ent. Permit" mean under Health & PPE Requirements section (confined space entry permit?). need to clarify/re-word-,
(9) Why are PPE requirements repeated in two sections of the plan (in Health & PPE Requirements section and in PPE section, which also adds more detail on APR cartridges, which is important); recommend just list overall "Safety & Health Concerns" in the matrix listing "PPE" as one concern and referencing the later more detailed section on PPE, which should also include INFO on glove/boot/splashsuit materials suitable for oil spill contaminants."

(6) Comments were received from the USCG-MSO San Diego and are marked “*”. RRT reply is marked "**".
*1. Appears that the 35-200 mile pre-approved zone needs further discussion. What is the Boundary for islands within the 35-200 mile zone. In the San Diego AOR the greatest potential for a significant offshore discharge is in the "gasoline alley" where the Navy does unrep, and in the Chevron Lightering zone. Both are within 35 miles of San Clemente Is."
**The pre-approval zone is 35-200 nautical miles off the mainland coast of California. It would appear that the pre-approval zone would include these risk areas. The FOSC would need to assure that the unprotected human population exposure limits were not exceeded.

*2. "It appears there would never be a time when the 3 criteria would not be met in the 35-200 zone barring any islands. Are these three criteria really established for determinations when within 35 miles or close to islands?"
**The proximity to islands issue was discussed previously. The three criteria are: (1) ISB is a viable option for oil removal; and (2) exposure limits for unprotected human population will not be exceeded; and (3) the plume or heat from the burn will not result in greater impact to sensitive wildlife resources than would the spilled oil. There might be instances in which any or all of these criteria could not be met, and then the ISB would not be pre-approved. For example, there might be other vessels in the area, with unprotected human populations which might be exposed to the plume. Another example - the oil might not be burnable or weather conditions might not be appropriate, or the available equipment might be lacking in order to effect a safe burn operation.

*3. "We are assuming that "population" excludes response personnel, other vessels, and aircraft for the purpose of evaluating the particulates downwind. If so we will probably never have to make the calculation. If we have to make the calculation as stated in the LOA, we lack the tool to do that."
**If the calculation being discussed is the measurement for particulates, then it is important that the FOSC or his designee work with NOAA to develop the protocol for monitoring and then assure that within the Incident Command System (ICS) there is a way for this monitoring to be done - either through contract or through one of the units of the ICS (the Pacific Strike Team of the USCG might be one possibility). The test is to monitor for particulates of a stated size and concentration at the breathing zone of potentially affected humans.

(7) Comments were received from MMS, marked “*”, and RRT reply is marked “**”.

*1. "Page 1, paragraph 4 - Language in the text should specify where monitoring of the smoke plume should take place to prevent exposure to the plume. We suggest following the Newfoundland Oil Burn Experiment Protocols to prevent exposure. We also suggest the use of smoke plume air models such as the one developed by the National Institute of Standards and Technology to predict the direction the smoke plume will travel.”
** It is not clear to which section this comment may pertain, since there is no paragraph 4 on page 1. However the thoughts may be useful suggestions to those preparing case-specific plans.

*2. "Appendix I, page 2. "Safety Concerns", 3. Vessel Safety:. We suggest including language regarding vessels which may be used to apply additives (Enhanced Burn Additives, emulsion breakers, etc.) to the contained oil slick prior to and possibly during the burn."
**This is an operational suggestion, which will be noted for the use of those preparing case-specific plans. Appendix I is meant to be a narrative summary of ISB as an oil spill response tool. This same comment applies to further statements about Appendix I.

*3. "Appendix I, page 2, "Safety Concerns" 3. Vessel Safety. We suggest adding language regarding the access of boat traffic, turning radius restrictions and the downwind restricted zones due to the VOSs and ROGs generated by the burning of a large oil slick."

*4. "Appendix I, page 2, "Safety Concerns: This section does not mention the measures to be taken in case of crude oils containing H2S, speed of the oil/gas separation, flammability and toxicity (MMS requires 15 ppm H2S as the lower threshold of platform restriction/evacuation preparedness"

*5. "Appendix I, page 2, "Safety Concerns". We suggest a sentence concerning SOx and H2S, that explain the behavior and related hazards from their characteristics. We suggest mentioning the importance of using a spark arrestor.

*6. "Appendix I, page 2, "Safety Concerns. The Section should include a paragraph regarding aircraft. It should specify the working ceiling for fixed wing and other aircraft for each work phase, i.e., mapping overflights, laser beam ignition, dispersant spraying, sample taking and aerial coordination of program phases (including wind monitoring and traffic coordination upwind and downwind)."

*7. "Appendix I, page 2, item 5. Emulsification - Emulsification is very different from weathering. Evaporation of an oil's light ends and the onset of water-in-oil emulsion formation in an oil slick often signals the closing of the window of opportunity for in-situ burning as a countermeasure. Water content in excess of 25 percent in a stable emulsion generally precludes ignition of the slick Application of an emulsion breaker can significantly extend the window of opportunity for in-situ burning."

*8. "Appendix I, page 3, second paragraph. Polynuclear Aromatic Hydrocarbons (PAH). We suggest to include and explain the fate of PCH also, because both PAH and PCH dilute rapidly as the smoke disperses."
**There is a statement in this section which observes that concentrations decline downwind.

*9. "Appendix II, Weather and Water Conditions - We question the need to include tides in a burn plan for 35-200 miles offshore. Tides affect the nearshore environment."
**This is true. Appendix II details are given as an example, which was developed for the Oceania RRT jurisdiction. We expect that an IN-SITU BURNING PLAN will be developed for each case-specific application and that the FOSC will approve it. The RRT will see the details, after the fact, when the FOSC Report is circulated.

4552.7 Case-by-Case Process

If in-situ burning is to be successful it must typically be undertaken within a small window of opportunity following the release of oil, which often can be measured in hours. In order to accomplish such a task, the UC must have a mechanism at its disposal to expedite the in-situ burning use decision. An accelerated review process will be conducted by the Planning Section of the ICS and is designed to provide the UC with sufficient information to determine if an in-situ burning use request should be made and to provide members of the RRT with sufficient information to approve or disapprove within the first two hours of its receipt. The Administrator of the OSPR is committed to ensuring that stakeholders, including State and Federal trustee agencies as well as local air districts, have input into any recommendation made for the use of in-situ burning. As the review process will be conducted by the Planning Unit, it is within this structure that the stakeholders will fit into the ICS. There is also a need for the petroleum industry to commit and stock necessary resources to successfully implement a timely ISB response.

4552.7.1 Air Quality Standards

Since burning will almost always provide for the greatest degree of environmental protection for on-water and nearshore resources (given the ability to remove on-water oil so quickly), a key issue is for the Unified Command to ensure that substances from an in-situ burn do not have a significant adverse impact to human health. The primary substance of concern is PM_{10}, the small particulate matter contained in the smoke plume. It is generally accepted that other substances dissipate, reaching background levels well before PM_{10} does. An in-situ smoke plume usually stays well above ground level --- hundreds to thousands of feet --- but can reach the ground under certain atmospheric conditions. An action level for PM_{10} has been established for these guidelines. It is recommended that in-situ burning should not be approved if there is significant risk that the standard would be exceeded where people could be exposed. As a general guideline, a decision to burn should not be made where humans would be exposed to concentrations greater than 50 g/m^3 averaged over a 24-hour period. However, the UC must also consider the risk to humans from the volatiles that evaporate since in some circumstances, the adverse impact to humans may be greater from the volatiles than from the particulate matter generated from a burn.

<u>Local Air Pollution Control Districts/Air Quality Management Districts</u>

Within California, local air districts bear the primary responsibility for control of air pollution from all sources except motor vehicles, which remain the responsibility of the Air Resources Board (California Health and Safety Code 4000, et seq.). Air districts are required to adopt and enforce rules and regulations and to prepare plans which make reasonable provisions to achieve and maintain State and Federal ambient air quality standards in all areas affected by emission sources under their jurisdiction, as well as enforcing all applicable provisions of State and Federal law. California has several different air basins within the State and each basin has an “attainment zone standard;” an air quality standard that is to be attained and maintained within the air basin. If attainment zone standards are exceeded, districts can impose several different regulatory mechanisms aimed at reducing air emissions and bringing the air basin back into compliance.

Under California law, the Administrator is responsible for the use of all ARTs in response to an oil spill in marine waters and he or she serves as the State representative on the RRT. During an oil spill, the Air Pollution Control Officer and/or staff members will be requested to take part in *in-situ* burn use decision through their participation in the ICS Planning Unit's ART section. The air districts can provide

meteorological data, insight to air/flow dynamics and dispersion patterns that are necessary for the UC to make appropriate decision in a timely manner.

Violation of Containment Zone Standards

Local air districts were concerned that if they authorized an *in-situ* burn event which resulted in the accedence of an ambient air quality standards, it could jeopardize their attainment status. The USEPA issued a letter indicating that in-situ burning as an emergency response would be exempt from the general conformity requirements and may be considered as an exceptional event when considering the area's overall compliance status. A copy of this letter can be found in Appendix 1. This letter simply makes clear that there is a mechanism to exclude the in-situ burning air quality impacts from the data used to determine an area's ambient quality standard attainment status.

4552.7.2 Trustee Agency Coordination

Marine Sanctuaries

Marine Sanctuaries comprise a significant portion of the coastal waters off California. The use of in-situ burning in the Sanctuaries will require coordination with the Sanctuary Managers and their staff. Though Sanctuaries are represented by the Department of Commerce delegate on the RRT, the Sanctuary Manager and/or staff members will be requested to take part in the In-situ Burning Decision-Making process through their participation in the ICS Planning Unit's Alternative Response Technology (ART) section. The Sanctuaries can provide resource data and insight necessary to make decisions that may otherwise not be available to the UC in a timely manner.

4552.7.3 Observation and Monitoring

Air quality monitoring is not a requisite for the approval of an in-situ burn use. However, a case-by-case approval of in-situ burning should be done in a manner that fully considers any potential impact to public health and safety. Monitoring will be instituted as quickly as feasible after the approval to burn. Lack of a monitoring program will not delay a burn after the RRT gives approval.

Until recently, there has not been a standardized approach to monitoring alternative response technology use. A working group of federal scientist and oil spill responders has recently developed the Special Monitoring of Advanced Response Technologies (SMART) program to monitor the effectiveness of alternative response technologies including dispersants. The in-situ SMART program provides a process to rapidly gather information on the emissions from an in-situ burn and provide the information to the UC in a timely manner. Once this program is finalized, it will provide a practical and cost effective approach to monitoring and should be incorporated into the in-situ burn policy.

4552.8 Procedures for a Case-by-Case Request

1) The FOSC contacts the proper agency representatives on the RRT (Appendix 3) and informs them that a request to utilize in-situ burning may be forthcoming. The FOSC will have the RRT remain on standby for the conference call in step 3.

2) ART Unit of Planning Section completes the In-Situ Burning Decision-Making Process submits summary of findings and information to UC on Case-by-Case Checklist Form and Supplemental Information Form.

3) If FOSC, based on information submitted by the ART Section, decides that a request for in-situ burning is appropriate, the FOSC schedules conference call with RRT representatives or alternates at first reasonable opportunity.

4) Conference call is conducted and Yes/No decision made based on information provided on FOSC Checklist, Supplemental Information Form or any other sources requested by the RRT, including information from the local air district.

5) The ART Unit of the Planning Section will commence with operations if a YES Decision is forthcoming.

Figure 1

Proposed In-Situ Burning Decision-Making Process

Decision Tree

Revised: 01/01/00

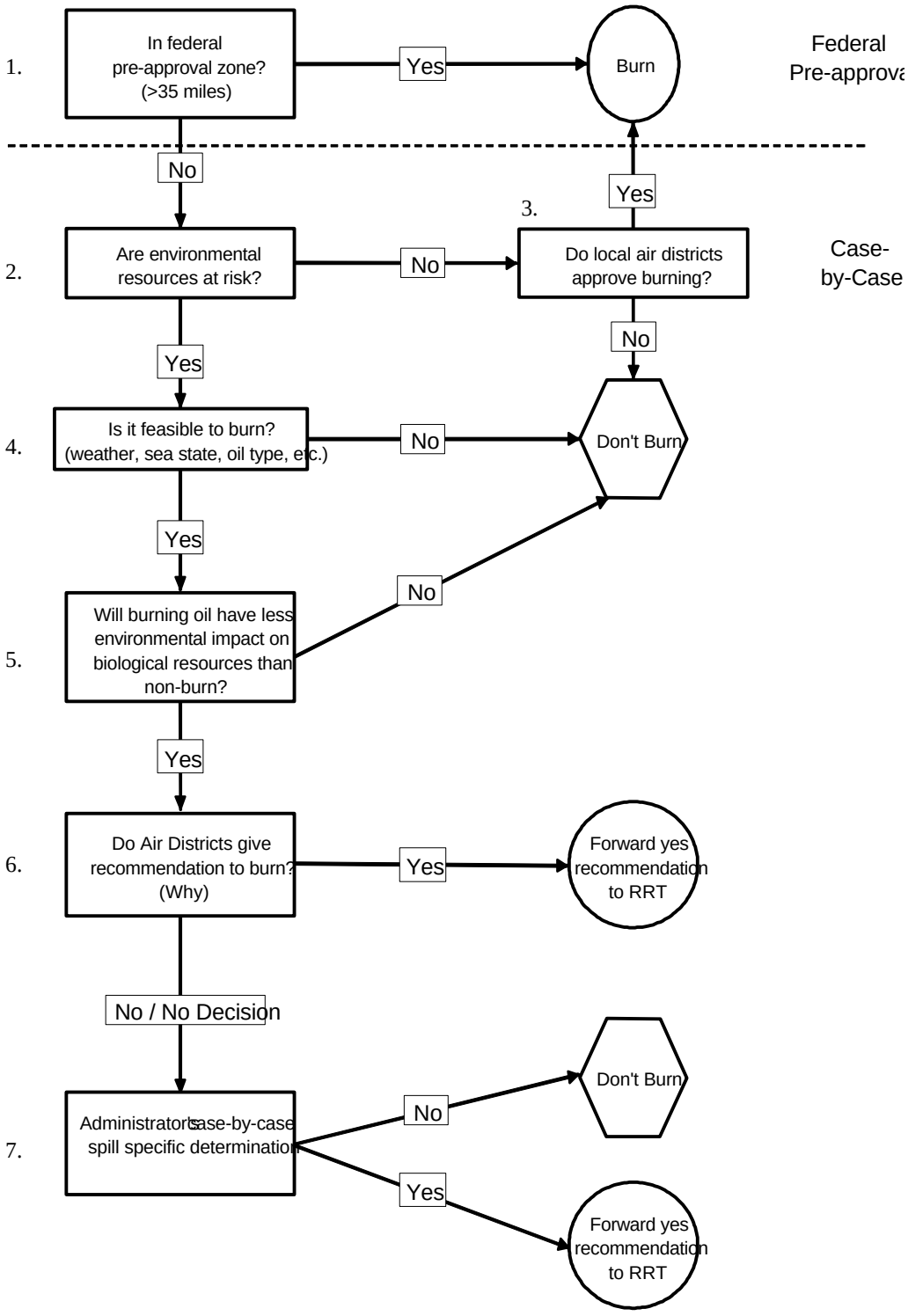

Figure 1 Decision-Making Points Explanations

The following discussion addresses the seven decision-making points that are a part of the approval process for the use of in-situ burning in marine waters. The discussion briefly identifies the nature of each point and also provides the rationale for each decision point. The number points correspond to the numbers in parentheses in the In-Situ Burning Decision Tree (found on the previous page).

1. If the proposed zone of in-situ burn is 35 miles off-shore and falls within the criteria of the Federal pre-approval zone, then an in-situ burn is Federally authorized by the RRT. State and local jurisdictions will be notified consistent with the provisions outlined in the LOA.

2. Most of the marine waters off California must be considered environmentally sensitive areas due primarily to the presence of foraging seabirds, migrating marine mammals, offshore islands with their marine mammal rookeries and haul outs, and the productive rocky intertidal and subtidal regions and associated kelp forests.

3. This specific path of the decision-making process would be very rare, indeed. There are not many situations (none foreseeable) under which an oil spill would not pose a threat to environmental resources. This decision point was included for purposes of completeness. If the unlikely situation occurred where environmental resources were not threatened, the UC would rely heavily on the recommendation of the local air districts for a burn/no burn decision.

4. Weather and sea state conditions can greatly affect the ability to burn oil on water. A minimum burn thickness is necessary to sustain combustion, so containment is always an issue. As this will mostly likely be accomplished by booming operations, those weather and sea state conditions that limit booming operations will operationally limit the ability to burn. As a general guideline, wave heights between 8-10 feet and wind speeds between 15-20 knots are generally the upper limits for boom operations.

5. The selection of in-situ burning as a cleanup/response tool is made using the hypothesis that spilled petroleum on the surface of the water (and eventually on the shoreline) or dispersal into the water column is more of a threat to natural resources than the combustion products are in the airstream. The hypothesis is tested using a data base that presents the resources at risk both on the surface of the water and within the surface microlayer and airstreams, by season, and how exposure to oil might affect the exposed species on a population basis. The risk analysis is based on the effects of petroleum on species populations at large and not individual animals, per se. All trustee agencies, local, state and federal, will work within the UC to determine if an in-situ burn will provide a net environmental benefit and better facilitate the protection of highly sensitive environmental resources.

6. Meteorological and other air dispersion characteristics will be an important component in the decision to recommend an in-situ burn by the local APCDs. Although vertical mixing is not usually a concern on the open water, plume dynamics can change if the wind direction changes and the plume comes into contact with land masses. For purposes of a case-by-case determination, the local air districts will provide their best professional judgement with respect to potential public health concerns and forward a recommendation to the UC.

7. There may be times when in-situ burning may be considered when local air districts are not in full support of the operation. Such circumstances would include the following:
a) if onshore contact with human populations is expected to be small enough to limit the level of concern; or b) to take advantage of the rapid elimination of oil that in-situ burning affords before weather

conditions change making cleanup almost impossible and causing extensive environmental damage. If the local air districts do not recommend the use of in-situ burning, the reasoning behind this must be detailed for review by the FOSC and possibly the RRT, should a recommendation for burning be forwarded. The information that should be detailed including any projected air mixing capability, any modeling and/or air quality exposure information and if concerns can be alleviated by means other than a non-burn decision (having people stay in houses for duration of burn), burning at night or non-peak hours. This information should be detailed on the supplemental case-by-case form.

8. Once the Checklist is completed and a decision for in-situ burning use is generated, the UC will forward their request, along with any requested data, to the RRT via a phone conference call. Based on the information provided, the RRT will provide an approval/disapproval decision for in-situ burning use.

Revised: 01/01/00

CASE-BY-CASE CHECKLIST

The Case-by-Case Checklist is used by the Unified Command to determine whether a request should be forwarded to the Regional Response Team for In-Situ Burning Use. If the answer to any of the questions is no, further information must be gathered and summarized to support the position that an in-situ burn should be considered. This information, as well as all other information, should be forwarded to the RRT.

Checklist:

1. Is the spilled petroleum burnable? Y/N

2. Can the appropriate equipment be made available in a timely manner to effectively conduct an in-situ burn? Y/N

3. Are weather and oceanographic conditions favorable for an in-situ burn? Y/N

4. Does the in-situ burn pose less of an environmental risk than leaving the petroleum on the water surface? Y/N

5. If required, have state and international boundary considerations been addressed? Y/N

6. Has the local air district recommended the use of in-situ burning? Y/N

7. Has the ART Unit of the spill response team recommended the use of in-situ burning? Y/N

Basic information regarding the spill (weather, location of slick, type of oil, trajectory analysis, resources at risk, etc.) - see attached forms.

Phone Call List (refer to the contact list in Appendix III)

EPA Y/N

USCG Y/N

DOC Y/N

DOI Y/N

CALIFORNIA Y/N

AIR DISTRICTS Y/N

Support Information For Case-by-Case

1. Spill Information

A. Incident Information:

Cause of Spill:

Date and Time of Spill

Location:

Volume and Type of Release (Continuing vs Instantaneous)

Potential Volume to be Released

B. Characteristics of Spilled Oil:

Oil Type/Name

Specific/API Gravity Flash Point

Pour Point Viscosity

C. Weather and Water Conditions/Forecast:

Water Temp Air Temp

Current Information

Wind Speed/Direction (present and 48hr projection)

Sea- State and 48Hr Projection

Tide Information and 48hr Projection

Comments

D. Oil Trajectory Information

Surface Area of Slick
24hr Slick Trajectory
48hr Slick Trajectory
Expected Land Fall (Location/Time)
Comments

2. Biological Resources at Risk
(Provided by OSPR in Consultation with Federal Trustee Agencies)

A. On-Water Resources

B. Shallow Subtidal Resources

C. Intertidal Resources

D. Anadromous Resources

E. Significant Surface Microlayer Resources

Supplemental Information

Below, please detail any reservations that may exist on the part of the local air district or any other technical specialists with respect to a proposed in-situ burn.

1. Nature of the Objections and Organization Raising the Objection: _____
_____
_____
_____
_____
_____

Overriding Concerns to the Objection and Proponent of this Position: _____
_____
_____
_____
_____
_____

APPENDIX IV
RRT CONTACT LIST

Name/Agency		Contact Number
A. Environmental Protection Agency		
Bill Robberson		415-744-2332
		415-744-1796 FAX
		415-885-4357 Home
	1-800-581-1372	PIN#879-0962 Pager
EPA Alternate 1:		
Michael Feeley		415-744-2219
	1-800-759-888 Pager	PIN#2832870
B. United States Coast Guard		
CAPT Frank Whipple		510-437-2942
		510-437-2961 FAX
	1-800-800-8689 Pager	PIN#714400334086
USCG Alternate 1:		
CDR John Koster		510-437-2956
USCG Alternate 2:		
CDR Ronald Hassler		510-437-2945
C. Department of the Interior		
Pat Port		415-744-4090
		415-744-4121 FAX
		415-431-4884 Home
DOI Alternate:		
Regional Environmental Assistant (TBD)		
DOI Alternate:		
Regional Biologist:		
Northern California	Jim Hass	916-978-5603
Central California	Steve Henry	805-644-1766
Southern California		619-431-9440

D. Department of Commerce

NOAA SF Area Site Mgr		415-556-0858
		415-556-8507 FAX
	1-800-Sky-Page Pager	PIN 1979797
DOC Alternate 1:		
Dave Kennedy		206-526-6317
		206-526-6329 FAX
	1-800-Sky-Page Pager	PIN 5798801
DOC Alternate 2:		
HAZMAT Duty Officer		206 526-6317

E. California Department of Fish and Game/OSPR

Don Lollock	916-445-8285
	916-323-4407 FAX
	916-360-5276 Pager
State Alternate 1:	
Yvonne Addassi (in-situ burning)	916-324-7626
	916-857-9550 Pager

F. NOAA/HAZMAT

Scientific Support Coor.		
Heather Parker Hall		510-437-5344
		510-437-5345 FAX
	1-800-SKY-8888	PIN 5798818

G. Local Air Pollution Control District Contact List

Mr. Wayne Morgan North Coast Unified AQMD 2300 Myrtle Avenue Eureka, California 95501-3328 (707) 443-3093 FAX (707) 443-3099	Mr. David Faulkner Mendocino County APCD Courthouse 306 East Gobbi Ukiah, California 95482 (707) 463-4354 FAX (707) 463-5707
Mr. James Guthrie Director of Enforcement Bay Area AQMD 939 Ellis Street San Francisco, California 94109 (415) 749-4979 FAX (415) 928-8560	Ms. Barbara Lee Northern Sonoma County APCD 109 North Street Healdsburg, California 95448 (707) 433-5911 FAX (707) 433-4823
Mr. Fred Thoits Monterey Bay Unified APCD 24580 Silver Cloud Court Monterey, California 93940 (408) 647-9411 FAX (408) 647-8501	Ms. Karen Brooks San Luis Obispo County APCD 3433 Roberto Ct. San Luis Obispo, California 93401-7148 (805) 781-5912 FAX (805) 781-1035
Mr. Ron Tan Santa Barbara County APCD 26 Castilian Drive, B-23 Goleta, California 93117 (805) 961-8800 FAX (805) 961-8801	Mr. Kent Field Ventura County APCD 669 County Square Drive Ventura, California 93003 (805) 662-6960 FAX (805) 645-1444
Mr. Mohsen Nazemi South Coast AQMD 21865 East Copley Drive Diamond Bar, California 91765 (909) 396-2662 FAX (909) 396-3341	Ms. Teresa Morris San Diego County APCD 9150 Chesapeake Drive San Diego, California 92123-1096 (619) 694-3342 FAX (619) 694-2730

4552.9 References

1. ATSDR (Agency for Toxic Substances and Disease Registry). 1991. Preliminary health advisory related to burning oil wells in Kuwait. In-situ Burning Workshop. May 1991.

2. Campagna, P.R. & Humphrey, A. 1992. Air Sampling and Monitoring at the Kuwait Oil Well Fires. In Proceedings of the Fifteenth Arctic and Maine Oil Spill Program Technical Seminar. June 1992.

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4. Evans, D., et al. 1992. Smoke Plumes from In-Situ Burning of Oils. National Institute of Standards and Technology.

5. Ferek, et al. 1992. Chemical Composition of Emissions from the Kuwait Oil Fires. Journal of Geophysical Research; 97: 14483-14489.

6. Gonzalez, et al., 1994. Texas Marsh Burn Removing Oil from a Salt Marsh using In-Situ Burning. In-situ Burning Oil Spill Workshop, Florida.

7. National Research Council. 1989. Using Oil Spill Dispersants on the Sea. National Academy Press, Washington D.C. 335 pp.

8. S.L. Ross Environmental Research LTD. 1990. "Evaluation of Capabilities to Respond to Large Oil Spills in California Marine Waters. Prepared for the California State Interagency Oil Spill Committee.

9. Sharratt, M. and M. Butler. 1992. Toxicological effect of oil smoke. In The Environmental and Health Impact of the Kuwaiti Oil Fires, Proceedings of an International Symposium, October 1991.

10. Shigenaka, G. & N. Barnea. 1993. Questions about In-situ Burning as an Open-Water Oil Spill Response Technique. National Oceanic and Atmospheric Administration. HAZ-MAT Report 93-3; June 1993.

4553 Oil Spill Cleanup Agents (OSCAs)

4553.1 Background

An OSCA is defined as any chemical, or any other substance, used for removing, dispersing, or otherwise cleaning up oil or any residual products of petroleum in, or on, any of the waters of the state or shorelines thereof. This category of substances would include surface washing agents and shoreline cleaners, dispersants, gelling agents, herding agents, emulsifiers-demulsifiers, chemical booms, sorbents (other than polypropylene or other inert products) and bioremediants.

The purpose of this subsection is to clearly outline the process for use of any OSCA during an oil spill response. The use of OSCAs are regulated at both the State and Federal levels. The following guidelines consolidate existing Federal and State policies and streamlines the approval process without jeopardizing proper environmental consideration of the use of an OSCA.

4553.2 Regional Philosophy

OSCAs are used to further enhance the ability for oil to be removed from the marine environment. While the use of chemical cleaning agents may be appropriate under proper circumstances, certain limitations must be recognized. The potential for toxic responses in indigenous fauna or flora to the cleaning agent must be considered.

4553.3 Authority

State of California Licensing Procedures

Government Code Section 8670.13.1 authorizes the OSPR to license OSCAs. The intent of the licensing process is to give the OSPR the opportunity to review product information, including toxicity, efficacy & degradation characteristics in a non-emergency situation, to determine if use of such a product would be beneficial. This provides the UC with as much flexibility as possible at the time of a spill without necessitating a thorough review of product literature. Although it is possible to use an unlicensed product during a spill incident, this can only be done on an experimental use basis, with approval by the State. Additionally, the use of an unlicensed product should only be considered if such use provides a result that can not be obtained any other way, including the use of a licensed product.

Federal NCP Product Schedule Listing Process

The federal EPA has primary responsibility for the listing of products on the NCP Product Schedule. Under federal regulations, an OSCA must occur on the Subchapter J Product Schedule of the NCP before it may be utilized at a spill.

Regional Response Team (RRT) Approval for Use

At the time of an oil spill incident, the UC can request the use of an OSCA. This is done through a formal request of the RRT. All Alternative Cleanup and Chemical Countermeasures must be approved in advance of use by the RRT. This includes dispersants, in-situ burning and chemical OSCAs. Once the RRT grants approval, a product can be used.

4553.4 Guidelines

If a product is licensed by the State and listed on the NCP, it can be used in spill response. The ART Section of the UC will provide specific information regarding the proposed use of the product needs to be submitted for review. The proposal for use of the product must be reviewed and approved by the UC (the Administrator of the OSPR and the FOSC). Once approved by the UC, a formal request must be made to the RRT. Once the RRT grants approval, a product can be used.

Revised: 01/01/00

Proposal for Alternative Response Technology Product Use

Date of Request:_____

Person Submitting Request:_____

Issue Statement: Please describe the issue being addressed by the proposal and the recommended solution for addressing this issue.

_____
_____
_____
_____
_____
_____
_____
_____

Problem Statement: Please describe the specific problem being addressed by this proposal.

_____
_____
_____
_____
_____
_____

Background Information: Please provide sufficient background information to provide a context for this proposal. This should include any site-specific, spill-specific or resource-specific information as well as any product information that is pertinent.

_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____

Possible Alternatives for Addressing the Problem: Please identify the possible alternatives for addressing the problem. This may include a "do nothing" alternative. Please provide the pros and cons for each alternative.

_____
_____
_____

Recommendation: Please specify the recommended alternative. Include any additional information you feel is necessary to make your case.

Procedures and Methodologies for Implementation: Please outline the specific experimental design & methodologies as well as the procedures for implementation of the recommended alternative.

4554 Bioremediation

4554.1 Background

Bioremediation is a treatment technology that enhances existing biological processes to accelerate the decomposition of petroleum hydrocarbons and some hazardous wastes. Bioremediation has been used extensively in waste water treatment of spilled oil. The most extensive field research efforts have been the shoreline treatment studies in Alaska following the Valdez incident. This research suggested that shoreline treatment by nutrient enhancement significantly increased degradation rates of oil when compared to untreated shoreline areas. The benefits of bioremediation, however, have not been adequately demonstrated through field applications. Consequently, this technology should be considered more experimental than an accepted standard for clean up of oil spills. The promise of bioremediation providing increased rates of oil degradation with minimal input of human effort to cleanup the spilled oil is attractive. However, the technology is time consuming, unproved in open water environments, and probably best suited to the treatment of specific types of shorelines and marsh habitats. At present, bioremediation should be viewed as a polishing agent for the final stages of cleanup rather than as a primary response tool - especially considering the slow rates of reaction to degrade the oil.

4554.2 Regional Philosophy

The primary objective of oil spill abatement and cleanup is to reduce the effect of spilled oil on the environment. Physical removal is the preferred method. However, mechanical recovery may be limited by equipment capability, weather and sea conditions, and spill magnitude. In addition, efforts and equipment used for mechanical recovery may prove to be more destructive to the environment than the original contamination with oil. Based on the results of current research, and a general understanding of the principles of bioremediation, this technology should be used strictly as a shoreline remediation tool with a preference for nutrient enhancement without the introduction of indigenous and/or non-indigenous microbes.

4554.3 Guidelines

Section 300.910 of NCP authorizes the use of biological additives for the dispersion/abatement of oil spills. The product must be listed on the NCP Product Schedule and on the list of products licensed by the SWRCB for use in the State of California to be considered for use along the California coastline. The following guidelines consolidate existing Federal and State regulations and streamline the approval process.

(A) Decision Process

The OSC shall adhere to the following:

(1) Inland and shoreline areas: The OSC will obtain approval from the EPA and the California Department of Fish and Game (CDF&G) representing the State of California. The EPA and State representative to the RRT shall consult with the DOI and DOC natural resource trustee(s).

Note: In California, bioremediation products considered for use must be on California's list of approved products, or be incident specific approved by the State representative to the RRT.

(2) Documentation/Technical Assistance: EPA, affected states(s), DOI, and DOC will each have a representative available to coordinate data collection and interpretation and to consult with the OSC.

(3) Monitoring: The application process and results must be recorded visually. This can be accomplished using film or video footage made from the shore or from the air. Visual observations can also be made by a trained observer. Filming should be done without causing delay to the bioremediation application activity.

(B) Documentation

The Bioremediation Checklist (Figure 4000.E) will be used by the OSC and staff to permanently record the decision to use or not to use bioremediation for a specific incident. Each agency resource trustee representative will be the point of contact for their constituency; the SSC will be the point of contact for all not represented.

BIOREMEDIATION CHECKLIST

SPILL DATA/INCIDENT INFORMATION

CAUSE (SPECIFIC): _____
_____
_____

DATE/TIME: _____

LOCATION: _____
_____

VOLUME AND TYPE OF RELEASE (Cont., Intermittent):_____
_____

POTENTIAL VOLUME TO BE RELEASED: _____
_____

CONFIDENCE IN DATA (high, medium, low): _____

CHARACTERISTICS OF SPILLED OIL

OIL TYPE/NAME: _____

SPECIFIC GRAVITY: _____ FLASH POINT: _____

POUR POINT: _____ VISCOSITY: _____

%AROMATICS: _____ %SATURATES: _____ __

%ASPHALTENES: _____

WEATHER AND WATER CONDITIONS/FORECAST (48HR)

WATER TEMP: _____ AIR TEMP: _____

CURRENT INFO: _____ WIND SPEED: _____

SALINITY: _____ WIND DIRECTION: _____

WATER DEPTH: _____ SEA STATE: _____

TIDE INFO: _____

COMMENTS: _____
_____
_____

BIOREMEDIATION CHECKLIST, PAGE 2.

HABITAT TYPE/AREA OF IMPACT:

1. _____

2. _____

3. _____

4. _____

5. _____

6. _____

7. _____

8. _____

Revised: 01/01/00

BIOREMEDIATION CHARACTERISTICS

	PRODUCT 1	PRODUCT 2	PRODUCT 3
NAME:	_____	_____	_____
MANUFACTURER:	_____	_____	_____
EPA LISTED:	_____	_____	_____
STATE LICENSED:	_____	_____	_____
STOCKPILE LOCATION:	_____	_____	_____
POINT OF CONTACT	_____	_____	_____
WHEN AVAILABLE:	_____	_____	_____
AMOUNT AVAILABLE	_____	_____	_____
AMOUNT NEEDED	_____	_____	_____
AMOUNT ON HAND	_____	_____	_____
TOXICITY:	_____	_____	_____
TYPE (CONCENTRATE/MIX)	_____	_____	_____
PHYSICAL REACTIVITY:	_____	_____	_____
APPLICABILITY ON OIL	_____	_____	_____
EFFICIENCY(% PROJECTED)	_____	_____	_____
APPLICATION MEANS:	_____	_____	_____
POSITIVE DOSAGE CONTROL	_____	_____	_____
DOSAGE RATE SETTINGS	_____	_____	_____
DOSAGE CHARTS AVAILABLE	_____	_____	_____

BIOREMEDIATION APPLICATION INFORMATION/EVALUATION:

PROPOSED BIOREMEDIATION APPLICATION PLAN:_____
_____
_____
_____

BIOREMEDIATION APPLICATION INFORMATION (CONTINUED)

EQUIPMENT PROPOSED FOR USE:_____
_____
_____

RESPONDERS ADEQUATELY TRAINED: _____

LOCATION OF AREA TO BE TREATED: _____
_____
_____

SCHEDULE OF BIOREMEDIATION OPERATIONS: _____
_____
_____

WHAT WILL THE WEATHER CONDITIONS BE AT THE TIME THE BIOREMEDIATION IS APPLIED: _____
_____

IS THE VEHICLE FOR APPLICATION EFFICIENT AND PROPER GIVEN THE CONDITIONS STATED ABOVE: _____

ARE MONITORING SCHEMES IN PLACE OR READILY AVAILABLE: _____

WITNESSES TO THE APPLICATION

NAMES	DATE/TIME
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

PLATFORM USED: _____
_____

OBSERVATION: _____
_____
_____

Revised: 01/01/00

VIDEO/PHOTO DOCUMENTATION RECORD

IN CHARGE:_____ IN CUSTODY OF: _____

CASETTE(S)NUMBER: _____ VIDEO EQUIPMENT TYPE:_____

ROLL(S) NUMBER:_____ CAMERA TYPE: _____

4555 Shoreline Cleaning Agents

4555.1 Background

Chemical agents applied to shorelines generally are designed either to prevent adherence (stranding) of oil or to release already stranded oil. The efficiency of mechanical cleanup operations may be enhanced by the use of shoreline cleaning agents by assisting with the refloating of oil or preventing its subsequent stranding. While the use of chemical cleaning agents may be appropriate under proper circumstances, certain limitations must be recognized. The potential for toxic responses in indigenous fauna or flora to the cleaning agent must be considered. As compared to dispersants, in which the chemical agents are immediately diluted upon addition to the water surface, shoreline cleaning agents often remain undiluted for prolonged periods of time and consequently can have a greater impact upon the indigenous biological and geological resources.

4555.2 Regional Philosophy

The primary objective of oil spill abatement and cleanup is to reduce the effect of spilled oil on the environment. Mechanical recovery and cleaning techniques are preferred over the use of chemical cleaning agents. However, mechanical recovery may be limited by equipment capability, weather and spill magnitude.

4555.3 Guidelines

The NCP, Section 300.910, authorizes the use of chemical agents to respond to discharges of oil. The following guidelines consolidate existing Federal and State policies and streamline the approval process without jeopardizing proper environmental consideration of the use of shoreline cleaning agents.

(A) Decision Process:

The OSC shall adhere to the following:

(1) Zone 1:

By definition, shoreline cleaning agents would be considered for use on oil stranded on shorelines. The OSC shall obtain approval from the EPA and State representatives to the RRT and the Natural Resource Trustee(s).

(2) Documentation/Technical Assistance:

EPA, State of California, DOI, and DOC will each have a representative available to coordinate data collection and interpretation and to consult with the OSC.

(3) Authorized Chemical Agents:

Only chemicals listed on the NCP Product Schedule and approved for use in compliance with Article Three (sections 2332 through 2336) of California Code of Regulation, Title 23, may be considered for use. Shoreline cleaning agents must be clearly labeled and licensed for this specific use. OSCAs categorized as dispersing agents cannot be applied to the shoreline [Article Three (Section 2332) of the California Code of Regulations, Title 23], and therefore cannot be used as shoreline cleaning agents.

(4) Monitoring:

The application process and results must be recorded visually. This can be accomplished using film or video footage made from the shore or from the air. Visual observations can also be made by a trained observer. Filming should be done without causing delay to the shoreline cleaning agent application.

RESOURCES AT RISK

ENDANGERED/THREATENED SPECIES _____

_____

MARINE MAMMALS _____

_____

AVIAN SPECIES _____

_____

SHELLFISH _____

_____

FINFISH _____

_____

SOCIOECONOMIC _____

_____

HUMAN HEALTH EFFECTS _____

_____

OTHER RESOURCES _____

_____

SPECIFIC COMMENTS:

_____
_____
_____
_____

DETERMINATION OF RRT

SSC RECOMMENDATION TO THE RRT/OSC:

_____
_____

DECISION OF THE RRT

DO NOT USE ALTERNATIVE CLEANUP TECHNOLOGY: _____
_____

INITIATE TEST APPLICATION: _____

USE IN LIMITED OR SELECTED AREAS: _____
_____
_____

USE TO THE MAXIMUM EXTENT POSSIBLE: _____
_____

OTHER: _____
_____
_____
_____
_____
_____

DECISION MAKERS:

NAMES	DATE/TIME
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

ATTACHMENTS:

4556 Reserved Areas for Research and Countermeasures Effectiveness

Oil spills serve both responders and scientists as opportunities to critically and quantitatively examine the environmental effects of, not only the spilled oil, but also the effects and effectiveness of innovative cleanup procedures or new cleanup products. A reference or control site is essential to most experiments.

The objective of most of these studies is to detect a difference or make a comparison between the different treatments. In order to measure the change, a reference or control is required; without this baseline, comparison of the results is impossible and the study is probably worthless.

One way to establish these much needed controls at spills of opportunity is by the use of "set-asides" (areas that are impacted by oil that are set aside and left untreated for experimental purposes). NOAA arranged for such set-asides immediately after the Prince William Sound spill. Having these sites made it possible to conduct the long term study of treatment effects in the Sound which is still continuing.

4560 S.M.A.R.T. Special Monitoring of Advanced Response Technologies/ Burning and Dispersant Monitoring

Special Monitoring of Advanced Response Technologies is a cooperatively designed monitoring program for *In-situ* burning and dispersants. SMART relies on small, highly mobile teams that collect real-time data using portable, rugged, and easy-to-use instruments during dispersant and *In-situ* burning operations. Data are channeled to the Unified Command to address critical questions: *Are dispersants effective in dispersing the oil? Are particulates concentration trends at sensitive locations exceeding the level of concern?* Having monitoring data can assist the Unified Command with decision- making for dispersant and *In-situ* burning operations.

The SMART Way:

Dispersants

To monitor the efficacy of dispersant application, SMART recommends three options, or tiers.

Tier I

A trained observer, flying over the oil slick and using photographic job aids or advanced remote sensing instruments, assesses dispersant efficacy and reports back to the Unified Command.

Tier II

Tier II provides real-time data from the treated slick. A sampling team on a boat uses a fluorometer to continuously monitor for dispersed oil one meter under the dispersant treated slick. The team records and conveys fluorometer data to the Scientific Support Team, which forwards it with recommendations, to the Unified Command. Water samples are also taken for later analysis at a laboratory.

Tier III

By expanding the monitoring efforts in several ways, Tier III provides information on where the dispersed oil goes and what happens to it. (1) Two fluorometers are used on the same vessel to monitor at two water depths; (2) Monitoring is conducted in the center of the treated slick at several water depths, from one to ten meters; and (3) A portable water laboratory provides data on water temperature, pH, conductivity, dissolved oxygen, and turbidity.

***In-situ* Burning**

For *In-situ* burning operations, SMART recommends deploying one or more monitoring teams downwind of the burn, at sensitive locations such as population centers. The teams begin sampling before the burn begins to collect background data. After the burn starts the teams continue sampling for particulate concentration trends, recording them both manually at fixed intervals and automatically in the data logger, and reporting to the Monitoring Group Supervisor if the level of concern is exceeded. The Scientific Support Team forwards the data, with recommendations, to the Unified Command.

Field Experience

SMART has already been successfully tested in the field. SMART was used to monitor dispersant applications in the Gulf of Mexico, and in February 1999 it was used to monitor the *In-situ* burning of the *New Carissa* off Coos Bay, Oregon. Spills and exercises like these help us to enhance SMART.

For detailed SMART information visit NOAA's SMART Page at:

http://response.restoration.noaa.gov/oilaids/SMART/SMART.html

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